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THREE CLINICAL STUDIES IN
TUBERCULOUS PREDISPOSITION

Three Clinical Studies

in

Tuberculous Predisposition

C
By

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It is seldom, if ever, between a consequent and one single antecedent that this invariable sequence subsists. It is usually between a consequent and the sum of several antecedents.

J. S. MILL, *System of Logic.*

TO
M. and M. I. R.

PREFATORY NOTE

THE observations which follow date from 1904. In that year the writer encountered at a sanatorium a consumptive who seemed a most unlikely victim to the disease. He had not been in contact with tuberculosis; was well built and vigorous-looking, heavy for his height; came of the upper middle class; was educated at a public school in the country; and lived in a far outlying London suburb, being fond of gardening and golf. His only previous illness was syphilis, from which he had made a good recovery. His work, otherwise very easy, involved rather frequent night journeys, and for a few years he had taken more alcohol than was good for him: but of course plenty of men keep their health in spite of conditions more adverse than these. However, one remark that he made seemed significant. He proffered the information that it took him a long time to take his (oral) temperature—on a cold morning the mercury would not rise at all under half an hour—because an obstruction in the nose he had always had compelled him to open his mouth frequently to draw a breath. On hearing this, the generalization was made, mentally, that nasal obstruction was a contributory cause of pulmonary phthisis. Observation of the other patients seemed to confirm, and on looking for literature on the subject, one met with an abstract of the paper of Moeller's mentioned in Part III, Chapter II. Three years later a small 'run' of ichthyotic consumptives was seen; on searching, some confirmation was got from Du Mesnil's thesis. Three years later again, it was noticed while photographing sputum-positive consumptives that squint was rather common.

On the first of these anomalies, namely nasal defect, the writer published some papers, viz. on mouth-breathing antecedent to phthisis, *British Medical Journal*, April 1905; on the application to recruiting, *Journal of Royal Army Medical Corps*, July 1906; on comparison of the phthisical with the non-tuberculous, *British Medical Journal*, June 1906; and of the phthisical with surgical tuberculous patients, *Idem*, December 1906; a bibliography of the subject (Jarvis, Lapalle, Solly, Clark, Freudenthal, Ingals, Talbot, Liaras, Kreilsheimer, Alexander, Moeller, Moure, Ducos, Laval, Harland, Bezançon, Roblot), *The Lancet*, December 1907; on rhinological treatment of consumptives* and pseudo-consumptives (these latter the subjects of pulmonary collapse-induration and of what will probably come to be known as du Magny's disease), *Practitioner*, April 1909; and on the application to the diagnosis of phthisis, *British Medical Journal*, August 1909. Also two ichthyotic-consumptive pedigrees were contributed to the opening number of the Galton Eugenics Laboratory's *Treasury of Human Inheritance*, while in July 1916 a preliminary note on squint appeared in the correspondence columns of *The Lancet*. All these communications save the fourth are superseded by the present one, and the writer has therefore decided to spare himself (further) the dubious rôle of *Auto-Referent*.

It had been originally intended to take as subject all clinical forms of tuberculosis, but difficulties connected with varying age distribution caused one to limit the present investigation to the disease due to pulmonary tuberculosis, i.e. to consumption or phthisis. There are, however, grounds for thinking that two at any† rate of these three anomalies are over-frequent also in surgical tuberculous patients.

* In this paper was first recorded the female incidence of intra-nasal atrophic change in consumptives.

† The chief doubt is about squint.

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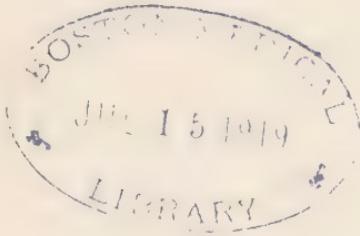
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PART I

CONSUMPTION AND ICHTHYOSIS



CONSUMPTION AND ICHTHYOSIS

As might be expected, since the 'isolation' of ichthyosis as the morbid skin condition we know nowadays dates only from the time of Willan, while tuberculosis was similarly definitively separated by a man but a few years dead, the literature of the association under notice, at all events such as is profitable to its present-day study, is all quite modern. And even these modern references are scanty and recondite. On the phthisiological side, there seem to be none at all; and on the dermatological, only four or five, of which the earliest is Gaskoin's (1). This author, who gave case-histories of 100 ichthyotics, found tubercle with undue frequency both in the patients themselves, and especially in their families. He said it was 'notorious' that very many subjects of ichthyosis died of phthisis. Lewin (2) remarked in a discussion that ichthyotics who easily catch cold (a known trait of theirs, of course) in some instances develop tuberculosis. According to Tommasolli (3), the disease amongst males affects almost exclusively those who are originally feeble and of imperfect development; and that even when ichthyotics seem in possession of good general health, the disorder is nearly always accompanied by functional derangement of some organ or system, or else by very evident predisposition to a grave visceral affection, like tuberculosis. Tommasolli also quoted a sentence from 'the reports of Vienna clinics' [not found in available Viennese medical publications] to

1. Gaskoin: *St. George's Hospital Reports*, London, 1877-79.
2. Lewin: *Monatshefte f. Dermatologie*, 1897, 14, S. 278.
3. Tommasolli: *Annales de Dermatologie et Syphilis*, 1893, pp. 537, 709.

the effect that ichthyotics ought really to be removed from the dermatological department to some other one, either because they are tuberculous—the most frequent complication—or because of heart disease, or for enlarged lymphatic glands, rickets, idiocy, and so forth. Lastly, Du Mesnil (4) communicated two cases of coincidence of tuberculosis (one pulmonary, the other of the cervical glands) with ichthyosis, and spoke of attenuated forms of the latter, consisting in xeroderma limited to the external surfaces of the arms and legs, which were to be observed in strumous subjects. The foregoing constitutes about all there is appertaining in dermatological literature, although Radcliffe Crocker's(5) note might just be added, of a boy with ichthyosis hystrix who had an appearance as of tuberculous diathesis.

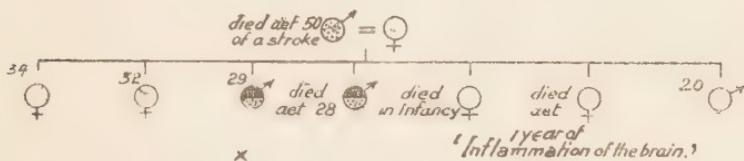
The present *Casuistik* numbers 23 patients, met with in the course of the last eight years, during which time about 1,600 consumptives came under notice. The appended particulars of this clinical material need no explanation, except as regards the pedigree notation. The black circle (♂ ♀) means a tuberculous subject (and in every instance, except the elder sister of Case XV, a consumptive) respectively male or female, while the dotted one (♂ ♀) denotes similarly an ichthyotic; co-existence of the two diseases being indicated by a circle half black and half dotted (♂ ♀). The numbers against members of the families refer to their ages, while the cross (x) put below distinguishes the actual patient.

4. Du Mesnil: *Thèse de Montpellier*, 1902.

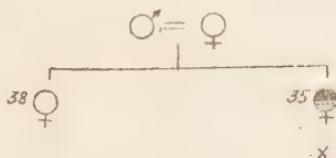
5. Radcliffe Crocker: *Transactions of Clinical Society of London*, 1879, xii. p. 181.

CASE I.—Corporal, invalided from British Army for tubercle of lung, and seen at Netley Military Hospital. Sputum positive. Rough skin on arms and legs as long as he can remember, and a sister similarly affected. No consumption in the family.

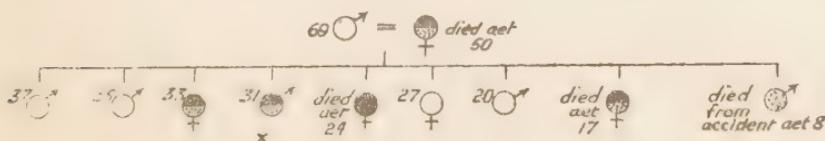
CASE II.—Jeweller, æt. 29. Phthisical symptoms for two years: left lung affected (dulness, prolonged expiration, and râles over upper lobe, with a few râles at the base). Sputum positive. Skin always rough all over, and the nasal mucosa affected—he had noticed for many years an occasional discharge of blood and crusts from the nose. His father's rough skin got much smoother after the age of thirty.



CASE III.—Housemaid, æt. 35. Phthisical symptoms for a year. Left lung affected (dulness and prolonged expiration upper lobe; dulness due to thickened pleura at base). Sputum positive. Skin rough all her life—it used to cause sores on hands and arms and blisters on the face, but of late years these have occurred much less often.

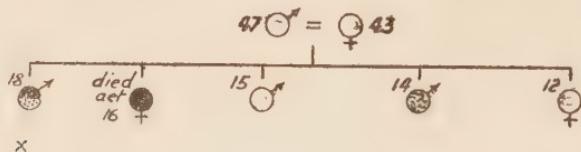


CASE IV.—Private soldier, æt. 31, invalided from British Army nearly a year previously for tubercle of lung. Both lungs affected (dulness left upper lobe; harsh inspiration, prolonged expiration, and moist sounds whole of left lung; harsh inspiration right upper lobe). Sputum positive. Skin always rough all over.

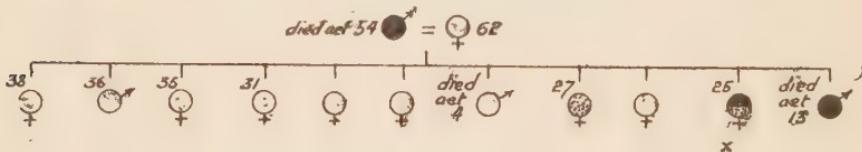


THREE CLINICAL STUDIES

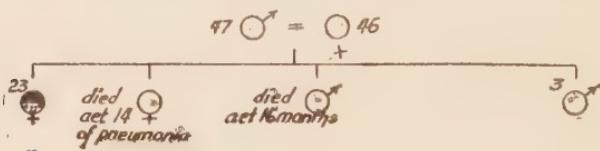
CASE V.—Clerk, æt. 18. Phthisical symptoms for six months. Right lung affected (dulness, bronchial breathing, and medium râles upper lobe and apex of lowest lobe). Sputum positive. Skin rough all over in childhood, now only on arms and legs.



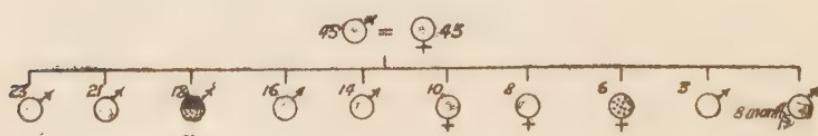
CASE VI.—Pawnbroker's assistant, æt. 25. Phthisical symptoms for a year. Both lungs affected (dulness and diminished breath sounds whole of right lung, with post-tussive râles at apex; dulness and harsh inspiration apex left lower lobe). Sputum positive. Skin rough from childhood, now mostly on the limbs.



CASE VII.—Tailoress, æt. 23. Phthisical symptoms for eight months. Both lungs affected (dulness, bronchial breathing, and râles right upper lobe and apex of lowest lobe; rough inspiration upper half of left lung). Sputum positive. Skin always rough, now chiefly on the limbs.

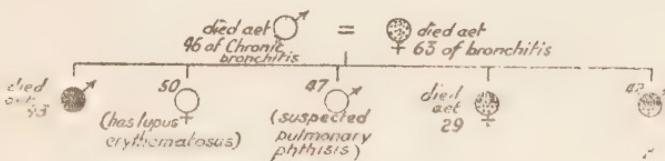


CASE VIII.—Baker's apprentice, æt. 18. Phthisical symptoms for nine months. Both lungs affected (dulness and râles over both upper lobes, with prolonged expiration at apex of right lowest lobe). Sputum positive. Skin slightly rough from childhood.



CASE IX.—Chauffeur, formerly corporal in Royal Artillery, æt. 34. Phthisical symptoms for seven months. Left lung affected (slight dulness and diminution of breath sounds at apex). Sputum positive. Skin rough on limbs and face for certainly the last eighteen years—thus before he contracted syphilis. Thinks he is the only one of his family (with whom he has lost touch) having rough skin, and does not know of any consumption amongst them. His mother died insane.

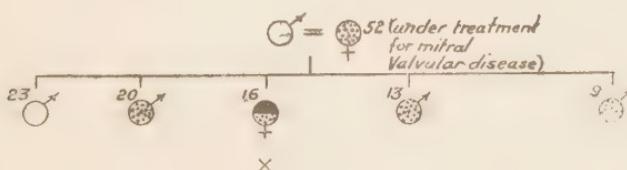
CASE X.—In wine and spirit trade, æt. 42. Phthisical symptoms for six months. Both lungs affected (dulness and râles at right apex, with small area of dulness at left apex). Sputum positive. Skin always rough on the knees and elbows.



CASE XI.—Labourer, æt. 16. Phthisical symptoms for nine weeks. Left lung affected (dulness and post-tussive râles upper lobe, the râles extending later to the whole lung). Sputum positive. Universally slightly rough skin ever since he can remember. He is one of a family of ten, with no other ichthyosis or tubercle.

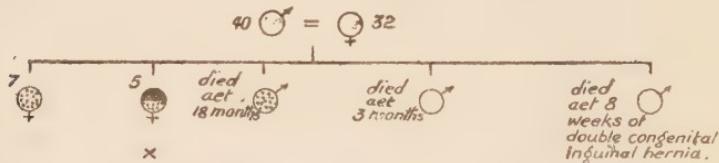
CASE XII.—Labourer, æt. 43. Phthisical symptoms for twenty weeks. Left lung affected (dulness, with diminished breath sounds and vocal resonance, but retained tactile vibration, at base of left lung; no fluid on needling). Sputum negative. Knows of no other member of the family, seven in number, having either rough skin or tubercle, although the father died of pleurisy. Had not specially noticed his own, but agreed that it was rough on the arms when their condition was pointed out to him.

CASE XIII.—Of no occupation, æt. 16. Phthisical symptoms for three months. Both lungs affected (prolonged expiration over upper lobe, and over apex of the lowest lobe, of right lung; pulse-rhythmic harsh interrupted breath sounds at the angle of left scapula). Sputum positive. Skin always rough on extensor surfaces. It was noticed in this family that the mother is dark, and so also all the children except the eldest, who is fair with red hair, and the only one smooth-skinned like the father.

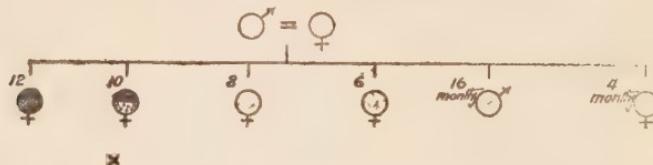


THREE CLINICAL STUDIES

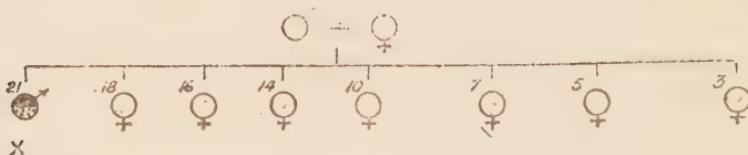
CASE XIV.—Schoolgirl, æt. 5. Phthisical symptoms for last four months, being sent up by the school medical officer, for tuberculosis. Both lungs affected (prolonged expiration right apex, with coarse creaks over both lower lobes). Sputum negative. Skin rough on arms and legs, slightly on face. A paternal female cousin also rough-skinned.



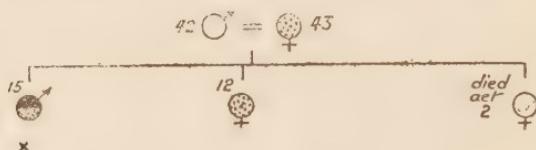
CASE XV.—Schoolgirl, æt. 10. Phthisical symptoms for two and a half years. Right lung affected (dulness, prolonged expiration, and coarse râles at apex). Sputum negative. Her elder sister under treatment for tuberculous knee. Rough skin, for which she has attended a skin clinic, since the age of eighteen months. Now rough on face, arms, legs, and slightly on body.



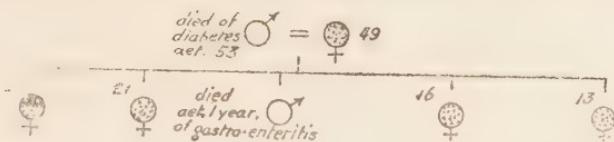
CASE XVI.—Collier, æt. 21. Phthisical symptoms for a year. Both lungs affected (prolonged expiration uppermost lobes). Sputum positive. Skin rough from childhood, now only on the lower half of the body and on his legs (it turns out that it is only the upper half that gets washed with any frequency). Nasal mucosa also involved. The mother reports that he was a fine child until the age of six months, but after that always undersized, ailing, and weakly. The rest of the family are all vigorous, and of a good deal bigger make.



CASE XVII.—Clerk, æt. 15. Phthisical symptoms for about nine months. Right lung affected (dulness and râles at apex). Sputum positive. Skin rough on upper arms and shins. The mother dates this from childhood.

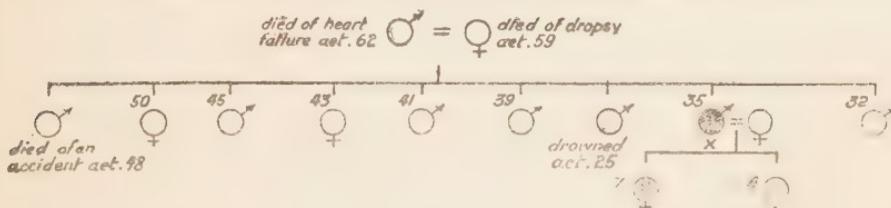


CASE XVIII.—Milliner, æt. 22. Phthisical symptoms for three years. Right lung affected (râles upper half of lung, with dulness and pectoriloquy over upper lobe). Sputum positive. Rough skin on upper arms, and particularly a branny desquamation on the shins. States she has always been like this.

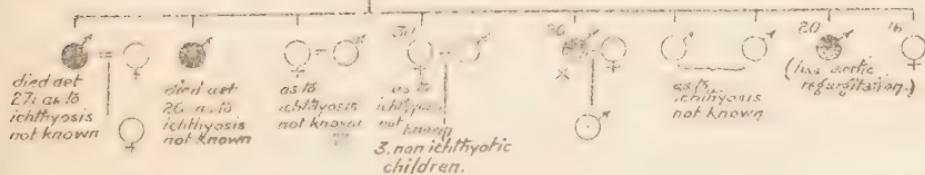


CASE XIX.—Insurance agent, æt. 27. Phthisical symptoms for ten months. Both lungs affected (dulness and râles upper lobes). Sputum absent. Slight skin roughness on arms and shins. It sometimes gets rough on the face. He had taken very little notice of it, but volunteered the information that he never perspired. He is an only child; uncertain as to rough skin in the parents.

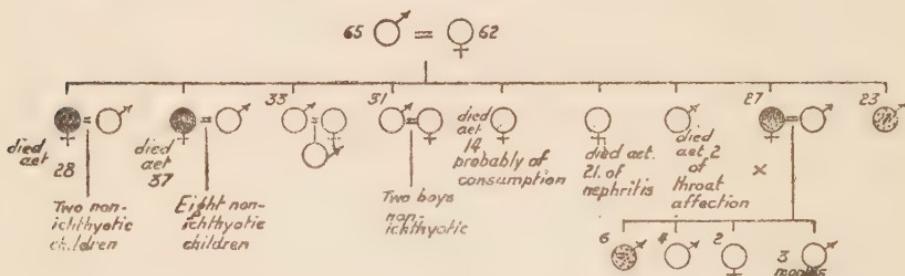
CASE XX.—Postman, æt. 35. Phthisical symptoms for a year. Left lung affected (dulness and prolonged expiration left upper lobe, with drooping left scapula). Sputum positive. Skin rough on arms and legs from a child.



CASE XXI.—Electrician, æt. 26. Phthisical symptoms for last month (pleurisy). Left lung affected (dulness and râles in suprascapular fossa). Sputum negative. Has mitral regurgitation, for which he was formerly rejected for the army. Skin rough on arms and legs from childhood. Nasal mucosa involved.



CASE XXII.—Housewife, æt. 27. Phthisical symptoms for last fifteen months. Both lungs affected (tenderness to percussion at right apex; dulness at left, with râles and prolonged expiration left upper lobe, and uppermost third of left lower lobe), also larynx (both arytenoids enlarged, especially the right one, and the right ventricular band swollen). Sputum absent. Rough skin everywhere except on the face; as a girl it was worse than it is at present.



CASE XXIII.—Collier, æt. 45. Phthisical symptoms for last four or five months. Both lungs affected (rough, interrupted inspiration left apex, with dulness, râles, and bronchial breathing over right upper lobe, and prolonged expiration at apex of right lowest lobe). Sputum positive. Rough skin on arms and legs from a boy. Is one of a family of twelve, of whom only four now living: most died young, none of consumption. Does not know of any with rough skin.

23 ichthyotics in some 1,600 consumptives is thus about 1·4 per cent.

Now what is the proportion of ichthyosis, including slight forms of xeroderma, one may expect to meet with in the general population? How may one control these observations of its frequency in phthisical persons by observation likewise of its frequency in non-tuberculous ones?

The proper subjects for comparative examination here are manifestly adolescents and young adults of a similar social class to that met with in hospital patients. The point of sex is matterless, because ichthyosis is known to have a fairly equal sex-incidence. Accordingly a useful 'control of normals' was found in a series of 500 youths and men, from a mixed industrial and farming district, candidates for enlistment as army recruits. There was only one individual with xeroderma, a fairly obvious case, though not severe, and dating from an early age. Now

it is not likely that a trifling disorder like rough skin would have prevented any from joining in the general rush to enlist which was seen in Great Britain in the early autumn of the year 1915 ; all the less likely because amongst these 500 candidates there also cropped up a bad case of psoriasis, a disease with a much more serious appearance than ichthyosis. The disabilities and shortcomings of current medical research, so largely directed to therapeutics and confined to obvious channels, are evidenced by the absence of morbidity statistics establishing the exact degree of prevalence in the community of every malady. However, from the above comparative figures—

1,600 phthisical subjects yield 23 ichthyotics (1·4 per cent.)
500 non-tuberculous subjects yield 1 ichthyotic (0·2 per cent.)

one is warranted in counting ichthyosis and xeroderma as much commoner amongst consumptives than in the population at large; perhaps as much as six or seven times commoner.

Again, the patients' brothers and sisters of whom we have a clear account number 103, divided into 19 ichthyotic and 84 non-ichthyotic. Now, although all were presumably equally exposed to infection, of the 19 ichthyotic 5 were consumptive, or a percentage of 26 ; while of the 84 non-ichthyotic 6 were consumptive, or a percentage of 7. Here the association of the two diseases is seen in the shape of a nearly fourfold incidence of phthisis amongst the ichthyotics.

DIAGNOSIS.

We may, however, have been taking matters a little too rapidly. What is not yet proved is that the skin roughness of these consumptives was indeed ichthyosis vera. Of the characters of that disease nearly all were shown. The *clinical appearance* was the same; no instance of *hystric* occurred, but on the contrary milder varieties,* limited to the extensor surfaces of arms and legs

* The ichthyosis of consumptives is like (as we shall see in Part III) the non-tuberculous nasal defect of the same, in that it is for the most part of a

(especially the upper arm), were common, just as noted by Du Mesnil. In three instances (cases II, XVI, XXI), which is a large proportion, a mucous membrane,* namely the nasal muco-perichondrium or muco-periosteum, was obviously involved. In one instance (case XVI) we find that washing the skin disguised the roughness, and of course frequent ablution is advanced as a reason why ichthyosis is often not recognized in infants until some time after birth. Absence of perspiration is a common ichthyotic symptom,† and it was spontaneously reported in case XIX.

The *history* given was like that of ichthyosis, the affection dating from early childhood.

Equally characteristic was its *course*, cases II, III, V, and XXII recording instances of amelioration with advancing age, while in cases XIII, XVII the mother had the disease less than the children.

As to *heredity*, a feature which Gassmann (6) describes as present in at least 25 per cent. of all cases, it will be noticed that 7 out of the 23 (thus 30 per cent.) showed this, and in a further 6 the disease was, if not hereditary, at any rate familial.

Ichthyosis affects the sexes about equally, or; as some say, with a slight preference for males—and as 12 out of the 23 came either from a consumption hospital or a sanatorium, both of which institutions had considerably more male than female beds, 15 of the former sex to 8 of the latter is a characteristic enough *sex-incidence*.

By dermatological writers a certain *sex-limitation* of ichthyosis has been described, consisting in 'a curious tendency' to pick out children of one sex in a family: it is seen in the classical instance of the Lambert family. This sex-limitation is shown by three or four out of the 23 (cases II, V, VI, and perhaps † XVIII)—the proportion

rather slightly marked, unobtrusive nature; which may be a reason why both these stigmata have so largely escaped notice.

* Some dermatologists deny the possibility of true mucosal involvement.

† See R. Crocker: *Diseases of the Skin*, 3rd ed., London, 1903.

6. Gassmann: *Untersuchungen über Ichthyosis*, 1904.

‡ About those members of a family who died in infancy there must remain

sex-limited in Stainer's (7) ichthyotic pedigrees, namely eight out of 45, being nearly identical. This author, whose careful thesis has obtained text-book recognition, also says that where no history of the disease in parents or collaterals is given, abnormal offspring are relatively fewer than in families that do show direct inheritance. Excluding cases I, IX, XIX, XXI, and XXIII, where no chance existed of getting to see the relations, and information was imperfect, those families in which rough skin is present in parents or collaterals, i.e. the families of cases II, IV, X, XIII, XIV, XVII, and XVIII, have 21 members with rough skin out of a possible 39, or more than 50 per cent.; while the remainder have only 15 members with rough skin out of a possible 81, or but 18 per cent. Stainer found, too, that hereditary transmission took place oftener through a female than through a male: and there are here 6 instances of the former (cases IV, X, XIII, XVII, XVIII, and XXI) to 2 of the latter (cases II and XIV). Thus the finer characteristics of ichthyotic inheritance and familial distribution are reproduced very faithfully in the present material.

Finally, we notice some evidence of an occasional morbid tendency, either personal or familial, described by the writers quoted to begin with, or in certain dermatological textbooks. Thus the rough-skinned mother of case XIII was when first seen already under medical treatment for mitral valvular disease. Case XXI had mitral regurgitation, his ichthyotic-consumptive brother aortic regurgitation. The mother of case IX had died insane. A younger brother of case XIV had died of congenital malformation.

The skin disorder of these tuberculous patients reveals itself, then, as true ichthyosis, and so cannot (unless all ichthyosis is to be supposed tuberculous or tuberculo-toxic in origin) be due to their tuberculosis; either directly through the specific virus—through irritation of the skin a little doubt as to ichthyosis, despite the excellent memory of mothers on such points, because of course babyhood often masks this skin affection.

7. Stainer: *Oxford Dissertation*, H. Frowde, 1910.

by tuberculous toxins circulating in it—or indirectly through the constitutional depression incidental to nearly every form of tuberculosis, telling in some way upon the skin. The theory that ichthyosis is a product of tuberculo-toxæmia in particular does not seem to have been anywhere stated, although Tommasoli has argued, without much encouragement, that its cause is general disturbance of nutrition or some chronic auto-intoxication. A tuberculo-toxic origin seems, however, quite unlikely, for ichthyosis is first seen at a time of life comparatively tubercle-free, as evidenced by the often-quoted autopsy finding, that absence of healed tuberculous foci is, roughly speaking, only found in infancy. Focal reactions to tuberculin occurring in the skin of ichthyotic subjects have never been described, nor have I seen any, although having given one or two of the foregoing tuberculin injections. In an ichthyotic case of surgical tubercle the test injection yielded a focal reaction only in the affected knee; at no place in the skin. The only skin eruption in a consumptive that I have seen show focal reaction to tuberculin was a papular tuberculide. Another argument adverse to any making of tuberculosis into the antecedent, and ichthyosis into the consequent, is the already mentioned known association of the latter disease with other malformations, which can hardly be also the results of tubercle. If the highly popular lead of Cohnheim (8), in putting down the characteristics of the tuberculous, from winged scapulæ to *spes phthisica*, as tuberculo-toxic and not possibly autochthonous, be followed consistently, then, as may be seen better farther on in this book, the polymorphism of the manifestations of tuberculo-toxæmia will be indeed remarkable. However, there is a skin dryness which occurs in the end stages of phthisis or other tubercle. Besnier (9) distinguishes from true ichthyosis an ‘atrophic xeroderma’ found in tabetics, cachectic subjects, old

8. Cohnheim: *Die Tuberkulose vom Standpunkt der Infektions-lehre*, 1880, S. 40.

9. Besnier: Note to French translation of Kaposi's Text-book on Skin es, Paris, 1891, ii. pp. 65, 66.

people or convalescents. Brocq (10) states merely that it is commonly supposed that skin dryness resembling ichthyosis may develop in certain cachexiae like tuberculosis and cancer, and in the senile. Mourad (11) refers to failure of cutaneous tuberculin reactions in cachectic tuberculous children with dry skins. In my experience this condition of the skin of some advanced consumptives is distinguishable at once from true ichthyosis by its absence of predilection for the extensor surfaces, by its larger desquamative flakes, and often by a yellowish colouration. Besides, there are wholly wanting of course the special features already described in respect of history, familial occurrence, etc. Moreover, several patients, namely cases III, IX, X, XVII, and XXI, had only early tubercle; nor was there any relation between the severity of the two affections, for cases XI and XIII, who both died within a few months from being first seen, had each slighter xeroderma than case IX, who was at work and keeping well two years after. In all the skin trouble was noticed at an early age, long before any lung or other symptoms developed.

Another skin disorder seen in tuberculous subjects and presenting some similarity to ichthyosis, which similarly only needs passing mention, is the chronic type of generalized exfoliative dermatitis, the disease often called pityriasis rubra of Hebra. Here three things—the predilection for flexor surfaces, the redness, and the fall of hair—are quite contra-distinctive. Recently Polland (12) has communicated a case occurring in a tuberculous subject in which he found microscopically in an excised piece of skin giant cells. These bodies are of course unknown in ichthyosis. There should not be much chance of confusing pityriasis rubra with the ichthyosis of the tuberculous.

The only indication at all that we have for considering

10. Brocq: *Traitemenit des Maladies de la Peau*, Paris, 1890, p. 384.

11. Mourad: *Ugeskrift for Læger*, 1914, Nr. 38. Analysis in *Centralblatt für die gesamte Tuberkulose-Forschung*, June 1915, S. 284.

12. Polland: *Dermatologische Zeitschrift*, 1914, Bd. XXI, H. 8.

tuberculosis as in any way concerned in the production of ichthyosis is in cases IV, VI, and XXI, where the ichthyotic patient had a tuberculous parent. The offspring's ichthyosis might just possibly be a skin dystrophy caused by derangement of the parental sperm or germ element by tuberculous toxin. Several writers, such as Morel (13) and Féré (14), have described somatic degenerative appearances in the children of subjects of various chronic intoxications like lead poisoning, paludism, habitual alcoholism, and so on; they have adduced some corroborative findings, too, from animal experimentation. The particular application to tuberculosis of this principle (that "sous l'influence des tares paternelles et plus encore maternelles, les cellules du fœtus sont modifiées au point de vue de leur structure, de leur fonctionnement, de leurs sécrétions") has been maintained by Charrin (15), who described malformations like polydactyly, spina bifida, harelip, club foot, etc., as occurring noticeably in the descendants of tuberculous persons; and also abnormalities, both macroscopic and histological, in the progeny of tuberculous rabbits. Conceivably cases IV, VI, and XXI may have got their ichthyosis after this fashion, although the consumptive mothers of the first and last were also ichthyotic. However, this 'dystrophic' origin should not be supposed in every ichthyotic with a phthisical parent, for I saw once an ichthyotic child, non-tuberculous, of a man with normal skin who first showed consumption three or four years after its birth. Here at first sight one was tempted to follow Charrin, and regard the child's skin condition as an 'heredo-dystrophy,' the result of latent tuberculosis in the father. Further inquiry showed, however, that this man's completely healthy brother had several ichthyotic (and non-tuberculous) children; so that the ichthyosis in both families was much more probably of the nature of a recessive character, latent in these two

13. Morel : *Traité des Dégénérescences*, Paris, 1857.

14. Féré : *La Famille névropathique*, 2nd ed., Paris, 1898, chap. xviii

15. Charrin : *Semaine Médicale*, 17 December 1902.

brothers, and coming to light in their children; a state of things reminiscent of Mendelian doctrines of heredity. And finally, if we grant a just possible application of Morel's principle in the three instances named, there remain other twenty which are inexplicable on hypotheses involving any sort of priority of the tuberculosis over the ichthyosis.

ICHTHYOSIS AND PHTHISIOGENY.

Everything so far, then, points to ichthyosis and xerodermia being signs of a tuberculous tendency. How further to interpret that phenomenon, missed by so many good clinicians doubtless because dermatologists see the disease in its subjects' childhood,* almost as soon, in fact, as the parents notice it, and thus before tuberculosis has had time to show, is not so easy. The simplest way to begin is to see if any circumstances attaching to ichthyosis would favour tuberculous infection. It must be allowed that several could. The hyper-keratinization of the skin, which at first sight seems a strengthening of a barrier against microbial invasion from without, must often, from the cracks and chapping and eczematous conditions it is apt to entail, really increase instead of lessening the skin's permeability; and increased permeability of the skin, occurring naturally in children and to some degree in women, has been advanced as a cause of predisposition to scrofula, and even to explain the facts that female children are more often scrofulous than male ones, and that women get lupus vulgaris † oftener than men do. Possibly this theory might similarly help to explain the sex incidence of Bazin's disease (*Erythema induratum*), a skin affection classed amongst the tuberculides, and certainly showing affinity with tuberculosis—claimed indeed by some to have been experimentally produced by intra-dermic inoculation

* The authors of the article in the dermatological volume of Allbutt's and Rolleston's *System* speak of ichthyotics as "boys and girls" and "children."

† As regards facial lupus, there seems another reason for female incidence, which is discussed in Part III.

of tuberculin in the form of intra-dermic local reaction, or else as the 'needle-track reaction' sometimes seen after ordinary subcutaneous tuberculin injection.

However that may be, undue skin permeability, arising in one way or another, is an approved predisposing agent to tubercle (compare Cornet (16), Gottstein (17), and recently Martius (18)). We may particularly note Heuter's (19) supposititious basis for a scrofulous diathesis, namely that such consists in a tissue vulnerability from undue size or numerousness of the pores between the epithelial or epidermic cells, leading to easier penetration by external noxæ, because that is a condition corresponding well with the actual state, as seen above, of the skin of many ichthyotics. And these same subjects certainly show proneness of the skin to bacterial invasion, because of the admitted frequency with which they suffer from acne and boils. In well marked ichthyosis, then, there may be some such rôle played,* especially when (although some dermatologists deny the possibility of such an occurrence) a mucous membrane is involved in the skin affection. The dry rhinitis which cases II, XVI, and XXI had is interesting in this latter connexion. Three instances of mucosal involvement in 23 subjects is probably a large proportion, and perhaps the explanation is that these 23 ichthyotics were also tuberculous subjects; and that tuberculous ichthyotics have

16. Cornet: Vol. "Tuberculosis," *Nothnagel's Cyclopædia*, American translation, 1904.

17. Gottstein: Art. "Disposition," Schröder u. Blumenfeld's *Therapie der chronischen Lungenschwindsucht*, Leipzig, 1904.

18. Martius: *Handbuch der Tuberkulose* in 5 Bänden, von L. Brauer, G. Schröder, u. F. Blumenfeld, Leipzig, 1914, Bd. I. (Analysis in *Centralblatt f. d. g. Tuberkulose-Forschung*, 30 September 1914, S. 769.)

19. Heuter: *Volkmann's Sammlung klinischer Vorträge*, 1870-75, 49.

* On this theory, however, it is surprising not to find instances of ichthyosis preceding tuberculosis of the skin itself, for if the tubercle bacillus enters by this road it would seem that the first organ encountered, namely the skin, should be sometimes at any rate affected; somewhat as rough 'undressed' wood is more liable to surface rot than the planed and smoothed article. But the writer has never seen coexistence of ichthyosis with lupus. And what is much better evidence of the extreme rarity of this association is the fact that dermatologists have not described the conjunction of two diseases both so familiar to their specialty.

the nasal mucosa involved (or have some other nasal lesion—a point we are coming to) oftener than non-tuberculous ones have. Records of the rhinological condition of ichthyotics are of course scarce, but Thibièrege (20) describes a case where the Schneiderian membrane was fissured; and Du Mesnil (*loc. cit.*) one of ichthyosis hystrix with cracks and haemorrhagic patches of the nasal mucosa, which lesions recall at once those seen in cases II and XVI. Such a condition, besides opening a way for local inoculation with aerial tubercle bacilli, would further favour tuberculous infection by reason of the impairment it entailed of the physiological nasal functions of moistening and filtering the inspired air: all nasal defect now beginning to be admitted, theoretically at any rate, to predispose to the development of pulmonary tubercle. But this point, the nasal condition of tuberculous ichthyotics, will be referred to again, and to better advantage, in the succeeding study (Chapter VI of Part III).

In pronounced ichthyosis then, particularly, perhaps, when the nasal mucosa seems to share in the general tegumentary disorder, the above highly simple mechanical explanation of resulting tuberculous vulnerability is quite plausible.

Seemingly not so, however, in that milder grade of disease already mentioned as occurring more frequently, in which—at any rate by the time adolescent age is reached—the skin affection amounts to no more than slight roughness of the upper arms, elbows, knees, and shins. Here the vulnerability to tubercle seems likely to be of a more indirect kind. Now, general weakness of constitution—what Grancher (21), in describing the characters of candidates for pulmonary phthisis, has well called ‘un amoindrissement des actes fondamentaux de la vie’—must self-evidently invite consumption; and some dermatological writers, such as Brocq (*loc. cit.*) and, as we have seen, Tommasoli, impute such to ichthyotics, while Robin (22) describes frequency among

20. Thibièrege: *Monatshefte f. Dermatologie*, 1892, 15, S. 136.

21. Grancher: Art. in *Traité de Médecine de Brouardel et Gilbert*, p. 594.

22. Robin: *Thèse de Paris*, 1897.

them of premature birth, and Du Mesnil quotes Cabot for liability of their mothers to hydramnios. Their lack of perspiration, too, would be adverse to high physiological efficiency; would in particular lessen elimination of tuberculous toxins, which are known to be in some measure excreted in the sweat. In the opinion of most, however, the general health of ichthyotics is unaffected; indeed, an authority like Hebra (23) has expressed himself to that effect.

But no diversity of opinion exists upon another point, which is the noticeable tendency of ichthyotics to present other and various forms of congenital defect. *Now, certain congenital defects are relatively common stigmata, not only in ichthyosis, but also amongst the tuberculous.* For the association of congenital cardiac malformation, and of congenital idiocy (especially the Mongolian variety), with consumption, one need not cite authority, it being described in every text-book. As to their association with ichthyosis, one may recall cases like that of Church's (24), of ichthyosis plus severe cardiac malformation—which is the sort of extreme instance that gets reported—whilst we have seen the opinion quoted by Tommasolli as to the proneness of ichthyotics to cardiac disease, and also the existence of a cardiac lesion in three ichthyotics in the present clinical material. As for idiocy, Gaskoin (*loc. cit.*) in more than one of his case-histories makes a note of faulty mental development, Tommasolli's quoted Vienna reports mention idiocy as a complication, while Raw (25) gave a case of epileptic idiocy associated with ichthyosis, nævi, and diffuse lipomata.

Again, defects of the external ear are according to Crocker (*loc. cit.*) the commonest congenital defect accompanying ichthyosis, and they form one of the two kinds of such defect mentioned in the article on ichthyosis in Clifford Allbutt's work aforesaid. They are also, it is easy to reflect, common (as consumption is) in the insane, and

23. Hebra: *On Diseases of the Skin.* New Sydenham Society's translation, 1874, vol. iii. p. 67.

24. Church: *St. Bartholomew's Hospital Reports,* London, 1865, i.

25. Nathan Raw: *Journal of Mental Science,* 1897, p. 832.

in fact form perhaps one of the 'stigmata of degeneration' which have survived adverse criticism. Now, in a careful, rather well reviewed article, Rossolimo (26) has described the absence of lobule—the so-called 'jug-handle ear'—as very common in the tuberculous. Holeman (27) too, after several years of observation of sailors invalided from the United States Navy for tuberculosis, described, in a paper abstracted in a continental tuberculosis publication, the common presence among them of stigmata of degeneration, especially deformities of the external pinna. These latter included the types of malformation associated with the name of Darwin, Wildermuth, Stahl, Blainville, and Morel. He roundly concluded that stigmata of degeneration may be considered stigmata of tuberculous susceptibility. Further, although of course small stress is laid upon this detail, in some Japanese work (28) there has been urged the frequent occurrence amongst tuberculous subjects (and of course consumption forms seven-tenths of all clinical tuberculosis) of polymastia and of supernumerary nipples. Now, if individuals with such atavistic tendencies be especially liable to tuberculosis, then one may permissibly cite also the atavistic theories of origin of ichthyosis due to Bowen (29) and to Renshaw (30). We may also recall that Fétré (31) has mentioned ichthyosis amongst the skin anomalies of degenerate subjects.

Lastly, and, as we shall see later, probably of especial importance, ichthyotic consumptives, like consumptives in general, are prone to a faulty nasal apparatus.

At all events, although this matter of a common complication with developmental defect must not be pushed too far, yet it is undeniable that there is to be found here a parallel between ichthyotics and consumptives. And if

26. Rossolimo : *Wiener klinische Wochenschrift*, 1908, Nr. 22.
27. Holeman : *Medical Record*, 18 December 1915.
28. Iwai: *The Lancet*, 5 October 1907. Otani: *Idem*.
29. Bowen: *Journal of Cutaneous and Genito-urinary Diseases*, New York, 1895, xiii. p. 485.
30. Renshaw: *A New Theory of Ichthyosis*, Manchester, 1914.
31. Fétré: *La Famille névropathique*, 2nd ed., 1898, p. 306.

external congenital defects, exposed and open to the view, exist in both, then it is reasonable to suppose that the same may hold good of internal and hidden ones, only discoverable on dissection or on examination by a specialist. Even so strong an upholder of the contagion factor in the pathogeny of tubercle as Cornet (32) admits that individual variations in the lymphatic system, where, as noted by Virchow, anomalies are exceptionally numerous, may, in certain cases, render tuberculous infection easier. This was conjectured also by V. Hansemann (33). The rather impressive work of Most (34) has shown at least that deficiency of the valves of the lymphatics would greatly widen the possible channels of tuberculous invasion. But tuberculous vulnerability may be incurred in other ways. The anatomist Geddes (35) has argued that the familiar prominent 'blue veins' upon the anterior thoracic parietes of consumptives are pretuberculous, and the mark of an internal condition which has conduced to their disease. Beneke's work on the exiguous cardiac and alimentary mechanisms of consumptives is too well known to need more than mentioning, while finally it is worth noting that according to Strauss (36), then assistant in Unna's clinic, the congenital anomalies of ichthyotics may include pulmonary emphysema; and this condition is not now, as formerly, held to be antagonistic to the development of consumption, but rather contrariwise. Indeed, at a period of natural bacteriological enthusiasm the words of Beneke (37) seem apter than when they were written :—

. . . die Entwicklung der Lungenschwindsucht in viel höherem Grade von anatomischen Anomalien und einer damit gegebenen Störung mechanisch bedingter Lebensvorgänge abhängig ist, als wir bis dahin geahnt haben.

32. Cornet : *Scrofulosis*. Translation by Bullock, London, 1914, p. 73.

33. v. Hansemann : "Die anatomischen Grundlagen der Disposition," *Deutsche Klinik von v. Leyden*, 1903.

34. Most : *Bibliotheca Medica*, Stuttgart, 1908, Abt. C, H. 21.

35. Geddes : *Dublin Journal of Medical Science*, 1 November 1909.

36. Strauss : *Monatshefte f. Dermatologie*, 1892, 15, S. 298.

37. Beneke : *Die anatomischen Grundlagen der Konstitutions-anomalie*, Marburg, 1878.

That all such structural abnormalities (but especially, as we see later, nasal defects) are rife amongst ichthyotics is highly likely: of such, with their phthisical vulnerability determining effect, ichthyosis may sometimes be merely the stigma.

GENERAL CONCLUSION.

In all three ways, then—from a penetrable skin, especially from diverse internal anomalies, possibly sometimes from naturally feeble constitution—if not in others as well (for the ‘efficient cause’ oftener comprises a plexus of antecedents than it presents only one), existence of ichthyosis may entail liability to consumption. There is thus something of an *a priori* case, which, added to the direct clinical evidence given first, establishes, to one judgment at least, ichthyosis as a sign of predisposition to consumption.

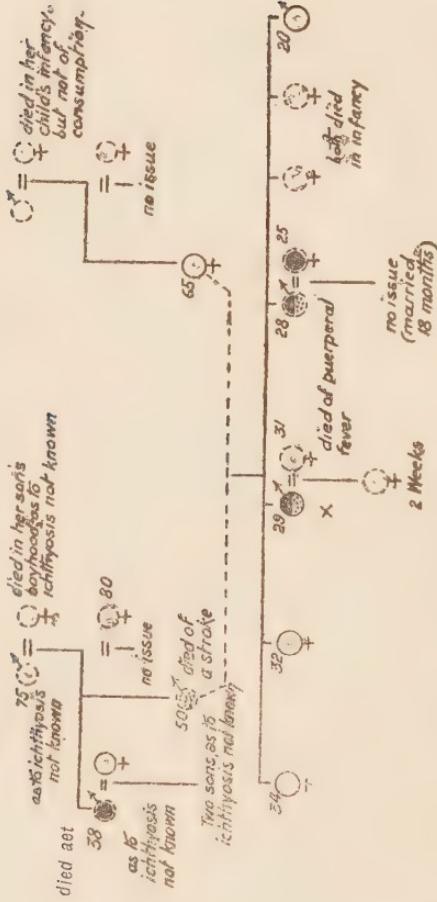
COROLLARY.

Ichthyosis once established as a sign of consumptive diathesis, an interesting corollary suggests itself. Ichthyosis is described by dermatologists as the most hereditary of skin diseases: therefore the predisposition to tubercle which sometimes accompanies it may possibly sometimes be hereditary too. The full pedigrees of cases II and IV seem to illustrate such a possibility. [It will have been seen already that two of the 23 ichthyotic consumptives had ichthyotic offspring.]

In both these cases consumption and ichthyosis came together into the family from the side of one parent, in case II the father’s side, in case IV the mother’s. And in the former family consumption selected among the children the only two ichthyotics, while in the latter only one ichthyotic escaped it, and he, perhaps, by dying of an accident in boyhood. It would probably be over-cautious to resist the impression that the hereditary ichthyosis in these two groups amounted to hereditary predisposition to tubercle.

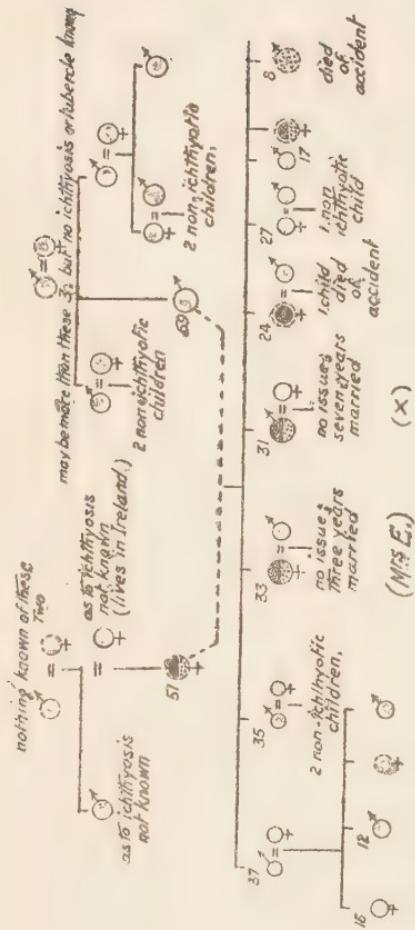
THREE CLINICAL STUDIES

Case II.



(Those dead at time of record marked by broken circles; other notation as before. No contact of patient (x) with uncle or with brother; the latter was healthy until marrying a woman with consumption.)

Case IV.



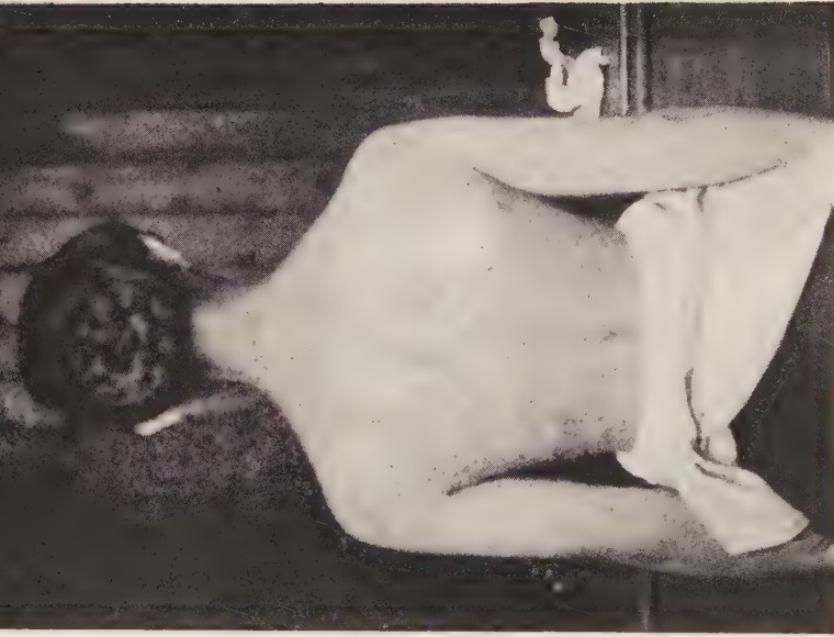
The only contact here was of the youngest sister (died at. 17) with the mother. All the other consumptives fell ill independently, and in the following order:—

1. Youngest sister.
2. Married sister who died at. 24.
3. Mother (died 1902).
4. Mrs. E., who with the patient was my informant. She married in 1904.
5. Patient (X) invalided from Army for tubercle of lung in 1907.

PART II
CONSUMPTION AND SQUINT

WOMAN (E. L.) WITH RIGHT-SIDED CONVERGENT SQUINT AND RIGHT-SIDED PULMONARY PHthisis.

Note drooping of shoulder girdle on affected side, a sign of (often early) consumption described by Aufrech, Krönig, Galecki, and others. (Right nipple, point of shoulder, and angle of scapula lower than corresponding parts on the left side.)



CONSUMPTION AND SQUINT

IT was, as already mentioned, when accumulating records of an unselected material of sputum-positive consumptives, who are mentioned more particularly in Part III, that the writer began to notice Squint—ordinary non-paralytic concomitant strabismus—occurring rather frequently amongst them. When case-sheets of 500 had been obtained, it was found that there were 6 squinting consumptives amongst the number, which proportion is equivalent to 1·2 per cent. This proportion seemed to the writer to be excessive, so in order to ascertain whether or no this impression was correct, a random sample of the general population—a sample similar in age and social rank, comprising servants and minor officials of various kinds (members of physically selected classes excluded), also fellow-passengers, people in a working-class district in the street and at railway stations, etc.—was examined for similarly obvious strabismus. In 900 of such there were seen 4 squinters, thus a proportion of but 0·4 per cent. The detailed comparison is shown in the table on the following page.

Squint, the ordinary concomitant variety, would therefore seem to be between twice and three times as common in consumptives as in the general population, the greatest discrepancy, perhaps, existing in the case of divergent strabismus in females. It may also be over-frequent in the healthy relatives of non-squinting consumptives. I find no previous observation to this effect. Presuming that this does not arise from the writer's ignorance of ophthalmological literature, a reason for the absence of anticipation may again (as in the case of ichthyosis) be that the

specialist concerned, in this instance the ophthalmic surgeon, sees the affection in its subjects' early childhood, before tuberculosis has had time to manifest itself. Also the ophthalmic surgeon has not opportunity, as the phthisiologist has, of living with large numbers of patients continually under observation. Then the inter-relationships of diseases which belong to different departments of medical practice

| CLASS. | CASES OF SQUINT. | |
|----------------------|------------------|------------|
| | Convergent. | Divergent. |
| Consumptives— | | |
| Male .. 359 | 3 | 1 |
| Female .. 141 | 1 | 1 |
| — | — | — |
| Total .. 500 | 4 | 2 |
| Control— | | |
| Male .. 500 | 2 | 0 |
| Female .. 400 | 2 | 0 |
| — | — | — |
| Total .. 900 | 4 | 0 |

must necessarily be neglected to some extent. Lastly, the words of Galton have to be remembered :—

I doubt whether the unaided apprehension of man suffices to distinguish between the frequency of what occurs on an average four times in ten events and one that occurs five times. Much grosser proportions have been wholly overlooked by doctors.

But these arguments are prompted simply by absence of mention of the connexion under notice in standard text-books and works on squint. The recesses of international ophthalmological literature are another matter. And fortunately in the present instance the distinction in frequency is nothing like so fine a one as Galton mentions.

Of the 6 squinting consumptives already mentioned, five are shown in the photograph opposite page 45. The one missing was a male, with convergent squint of the



WA I



WF



TS



ED.



LT



NC (act 5)



RR



CLA



FF



TH



EL act 8



HT

QUINTING CONSUMPTIVES.

To face p. 45.

right eye. Since the above were obtained, seven more cases of phthisis plus strabismus have been met with. Their photographs are the last seven on the opposite page. But not all (although most) of these had tubercle bacilli in the sputum. Still, they were all on general clinical grounds indubitable cases of consumption, so diagnosed, in two instances, by other tuberculosis officers than the writer.

There is thus, in all, a study material thirteen in number, the *Casuistik* of which is now appended:—

1. W. A. I. Fitter, æt. 22, married. Phthisical symptoms for six months. Both lungs affected (sharpened inspiration and prolonged expiration left upper, and the same, with râles, over the left lower, lobe; dulness over right clavicle and at right base, where there are also creaks and diminished breath sounds). Sputum positive. Left convergent strabismus. Family history of *Squint*, not ascertained; of *tubercle*, father died of consumption æt. 44, and sister in childhood of tuberculous ankle.

2. W. Y. Grocer's assistant, æt. 31, married. Periodically recurrent phthisical symptoms since left-sided pleurisy five years previously. Had enteric fever æt. 9. Both lungs affected (dulness and râles over left upper lobe, dulness at left base; a few post-tussive râles above the right clavicle). Sputum positive. Left convergent strabismus. Family history of *Squint*, not ascertained; of *tubercle*, mother died of consumption æt. 48, two brothers æt. 28 and 13, and one sister æt. 17.

3. T. S. Labourer, æt. 33, single. Phthisical symptoms for three months previously. Both lungs affected (dulness over most of right lung, with râles over uppermost lobe; diminished breath sounds over upper part of left lung, with a râle or two above left clavicle). Sputum positive. Left divergent strabismus. Family history of *Squint*, not ascertained; of *tubercle*, none—although his father died of pleurisy æt. 55.

4. E. D. Book sempstress, æt. 31, single. Phthisical symptoms for the last three years. Both lungs—the left the most—extensively affected (all five lobes). Non-tuberculous thickening of the posterior wall of the larynx. Sputum positive. Right divergent strabismus. Family history of *Squint*, not ascertained; of *tubercle*, father died of consumption æt. 58, and two brothers æt. 19 and 20.

5. L. C. Typist, æt. 25, single. Phthisical symptoms for three months previously, although she had had slight pleurisy nearly two years before that. Both lungs affected (dulness over left upper lobe—eventually a cavity there—with râles down to the angle of the scapula; dulness over the right clavicle, with a few râles above it. Later a left-sided partial artificial pneumothorax was induced, with some temporary benefit). Sputum positive. Left convergent strabismus. Family history of *Squint*, not ascertained; of *tubercle*, brother died of consumption æt. 32, and sister æt. 28.

6. T. C. (photograph not shown). Labourer, æt. 27, married. Phthisical symptoms for eight weeks previously (haemoptysis). Both lungs affected

(dulness over right upper lobe and apex of lowest lobe; a few râles above the right and below the left clavicle). Sputum positive. Right convergent strabismus. Family history of *Squint*, not ascertained; of *tubercle*, none.

7. N. C. Schoolboy, æt. 8, sent from school by medical inspector for pulmonary tubercle. Phthisical symptoms for six months previously. Right lung affected (bronchial inspiration and prolonged expiration under right clavicle). Sputum absent. Left convergent strabismus, certainly present at three years old (see photograph). Family history of *Squint*, none; of *tubercle*, maternal uncle only.

8. R. R. Collier, æt. 31, single. Phthisical symptoms for a year. Right lung affected (pleuritic rubs near angle of right scapula). Sputum at first negative, later positive. Left convergent strabismus. Family history of *Squint*, none; of *tubercle*, none.

9. C. A. A. Housewife, æt. 22, married. Phthisical symptoms for fifteen months. Both lungs affected (dulness and râles over both uppermost lobes in front, with râles in the left suprascapular fossa). Sputum at first negative, later positive. Left divergent strabismus. Family history of *Squint*, none; of *tubercle*, father died of phthisis.

10. F. F. Widow, æt. 25. Phthisical symptoms for five months. Right lung affected (dulness and increased vocal resonance over the upper part of the right uppermost lobe). Sputum negative. Left divergent strabismus. Family history of *Squint*, none; of *tubercle*, mother died of tuberculous enteritis, and a brother later became phthisical.

11. T. H. Farm labourer, æt. 33. Phthisical symptoms for six months. Both lungs affected (extensive disease of the left upper and lower, and of the right uppermost, lobes). Sputum positive. Left convergent squint. Family history of *Squint*, none; of *tubercle*, none.

12. E. L., of no occupation, æt. 20, single. Phthisical symptoms for a year. Right lung affected (shoulder drooping, slight prolonging of expiratory breath sound below the clavicle, and slight narrowing of apical isthmus of resonance, all on right side). Sputum negative. Right convergent strabismus, certainly present at eight years old (see photograph then, also half-length one æt. 20). Family history of *Squint*, none; of *tubercle*, a cousin consumptive.

13. H. T. Schoolboy, æt. 13. Sent from school some months before for pulmonary tubercle; had been under treatment for some weeks when first seen. Whole left lung affected, with severe constitutional involvement. Sputum positive. Left convergent strabismus. Family history of *Squint*, none; of *tubercle*, father died of consumption æt. 49, and eldest brother æt. 18; another brother consumptive, but doing well under treatment.

The above were thus quite ordinary cases of pulmonary phthisis. There had been no severe illness preceding the pulmonary affection, save in one instance, the enteric fever of W. Y. The squint, of course, had always long preceded the consumption. Every individual, or the friends, reported that the squint dated from childhood, from before walking was learnt, and so on; evidence which is confirmed by the early photographs of N. C. and E. L. About this

material one sees two things that, in spite of its small extent, may be characteristic. The first, on which little stress is laid, is that there may be excess here of thoroughly consumptive families, families with three or more members victims to that disease. The second, that in ten out of the thirteen patients, the *left* eye is the one that squints. In the only two further instances of consumption plus squint * met with subsequently (one of which, diagnosed phthisical by a colleague—as indeed they both were—is shown facing p. 99) it was again the left eye which was at fault. And so likewise in four-fifths of the small number of squinting surgical tuberculosis cases as yet found.

In sum, out of a total of twenty tuberculous persons who squinted, no less than sixteen squinted with the left eye. Now we know, of course, that convergent squint is a good deal commoner than the divergent form; and there are here, quite accordingly, fifteen convergent to five divergent. But text-books describe no such preference of strabismus for one or other eye. I do not find enough homolaterality of the squinting eye with the tuberculous lesion to be, in view of the paucity of cases, worth mentioning. But there does seem to exist some connexion between squint in tuberculous disease and the condition of *left-handedness*. It was not until recently that the possibility of this connexion occurred to me, and therefore information on this head regarding one or two cases, mostly earlier ones, is lacking. However, from fifteen (ten phthisis, five surgical tubercle) information was obtained, and of these fifteen three (two phthisis, one surgical tubercle) were left-handed and one (a case of surgical tubercle) was ambidextrous. All the left-handers knew of left-handed relatives, the consumptive ones giving an especially strong family history. Also a right-handed boy with tuberculous cervical glands had a grandfather left-handed, a right-handed girl with tuberculous knee a left-handed mother and maternal grandfather, and a right-handed consumptive a left-handed

* In both of these the nasal condition was normal: for the bearing of this fact see Part III, Chapter VI.

brother. In sum, of the fifteen tuberculous squinters, 20 per cent. were left-handed, whilst 40 per cent. knew of left-handed relatives.

Now, these figures are much higher than the normal proportion. Merkel (*Die Rechts- und Linkshändigkeit: Ergebnisse der Anatomie und Entwicklungsgeschichte*, Wiesbaden, Bd. XIII, 1903), after comparing many estimates, concludes that from 2 per cent. to 4 per cent. of the general population are left-handed. Brinton (*American Anthropologist*, May 1896), who was cited by D. Cunningham in his 1902 Huxley Lecture on the subject, and not cited by Merkel, gives the same figures. Gould (*Popular Science Monthly*, January 1908), gives 2 per cent. A possible biblical finding (*Judges xx. 15, 16*) is 700 in 26,700, or 3·8 per cent. As to the heredity of mancivism, that has been described by several authors, and is admitted by Merkel and by Cunningham. Ogle stated that of 57 left-handers 27 knew of left-handed relatives. This is 47 per cent., a large proportion, but one very little larger than the corresponding 40 per cent. amongst tuberculous squinters, mentioned at the close of the last paragraph. Notwithstanding our unavoidably small material, then, it seems on the whole likely that tuberculous squinters are left-handed more often than is usual. This likelihood is somewhat strengthened by examination of their pedigrees. I find no case in which tubercle appeared in the family from the side of one parent and left-handedness from that of the other. But of their both appearing from one side there is the following instance. The squinting left-handed consumptive F. F. had a healthy right-handed father, now over seventy years of age, whose stock showed neither tuberculosis nor mancivism. Her mother, on the contrary, died of tuberculous enteritis (so stated on the death certificate), was left-handed and had a left-handed brother. Of the eight children, two, F. F. herself and her youngest brother, are left-handed : they are also the only two tuberculous ones. F. F. was healthy until marrying a first cousin on her mother's side (son of a

maternal uncle). This man developed pulmonary and severe laryngeal tuberculosis, and the writer had to amputate the epiglottis for dysphagia: he was thus a very infectious case. For a year before his death he could not work and lived with his wife's people, and there were thus exposed to infection three right-handed persons (father-in-law, sister-in-law, and a brother-in-law recently killed in the war, the only one dead out of this family) and two left-handed ones, the wife and the brother-in-law aforementioned). Only the left-handers became tuberculous. Whatever the explanation, it will be allowed that in this family the distribution of tubercle and of left-handedness almost coincided.

But a possible fallacy in connecting left-handedness with squint in tubercle, a fallacy which at first seemed to me the probable explanation of the phenomenon, is that all tuberculous persons, at any rate all consumptives, comprise an unusually great proportion of left-handers. On trial, however, this seems not to be the case, at least as regards phthisis. In 140 non-squinting consumptives (93 male, 47 female) I found but 4 left-handed (all men). One only out of these four knew of left-handed relatives. Seven were ambidextrous (6 men, 1 woman); and out of the whole 140, 17, or 12 per cent., knew of left-handed relatives. The proportional occurrence of manciniism in non-squinting consumptives—4 in 140, or 2·8 per cent.—is thus just about what we have seen to be the normal one. It is much below that found in squinting consumptives (20 per cent.); and so, too, is the proportion giving a family history of manciniism (12 per cent. as against 40 per cent.).

What may be the nature of the association of squint and left-handedness in tuberculous persons? The only references found to the bearing of ocular conditions on manciniism are from work by Gould and by van Biervliet. Gould (*Ophthalmology*, October 1904) believes that, with some exceptions, the left-handed person is also left-eyed (i.e. uses the left eye by preference for 'fixing' objects, makes it the 'dominant' one of the two) and the right-

handed right-eyed ; and that in the adult the dominant eye will preserve its dominancy despite a considerably higher degree of amblyopia, ametropia, etc., than that of its fellow. He cites Noyes for the finding that, in 1,000 patients, those with hypermetropia had it more severely in the left eye. Van Biervliet (*Revue philosophique de la France*, February 1899), testing right-handed people against left-handed, mentioned that in the eye tests he first excluded from his material, which by the nature of the case included an unusual proportion of left-handers, numerous subjects with gross ocular malformations: three are specifically mentioned, but squint is not among them. Biervliet found his left-handers stronger with the left hand, sharper of vision with the left eye, and of hearing with the left ear, whilst the senses of touch and of muscular sensibility were better in the left upper extremity as compared with the right one. In his right-handers the converse results were described.

All that requires to be said here about the above is that it is interesting, and possibly yields sidelights on our subject. It may be that only those tuberculous persons who squint with the *left* eye are especially likely to be left-handed, for none of my cases (extremely few, of course) was who squinted with the right eye. Nevertheless, the work of these two men certainly supplies no direct answer to our question.

Perhaps more elucidation may be got by considering in what special classes of humanity mancinnism is frequent. Lombroso (*The Man of Genius*, London, 1898, p. 13) considered mancinnism a character of atavism or degeneration, and said that 'many' men of genius have been left-handed. Voisin (*L'Idiotie*, 1893, p. 272) says that idiots have a tendency to employ the left hand when being taught to form letters. Féré (*La Famille névropathique*, 1898, p. 315) enumerates left-handedness among the functional stigmata of degeneracy. Merkel (loc. cit.) made the general statement that left-handedness is perhaps more frequent in children, women,* savages, lunatics, and criminals. Ireland

* This, in view of the greater male tendency to congenital anomaly in

(*Brain*, vol. iii.) found few right-handed amongst microcephalic idiots, in whom ambidexterity, on the contrary, was very common. A physician at the Darenth Institution told Cunningham (*loc. cit.*) that of 10 microcephalic idiots, 5 were right-handed, 1 left-handed, and 4 ambidextrous. Unduly frequent mancinism has been several times described amongst criminals. Hirschfeld (*Die Homosexualität*, Berlin, 1914), who has studied very fully the handwriting and other characters of sexual inverters, records 6 per cent. of them left-handed and 7 per cent. ambidextrous. I have heard the opinion of a medical man that left-handedness is over-common amongst stammerers.

Not all the above special classes are on a par as regards their mancinism, real or imputed. Right- or left-handedness is now regarded as partly an acquired trait, developed from a primitive condition of ambidexterity. In the foetus no difference is to be made out as regards the bones of the two sides, and at birth ambidexterity is present and may persist up to the sixth or even the ninth year. Young children then may show some mancinism owing to an undifferentiated condition, somewhat like the more doubtful sexual undifferentiation at puberty (regarding the sexual object) described by Max Dessoir and other sexuologists. If Merkel's statement *re* savages be accepted (although W. H. R. Rivers found only 0·75 per cent. of the inhabitants of Murray Island left-handed) somewhat of the same explanation may apply. But the chief of the remaining classes, at all events idiots, are those which have on other counts been reckoned degenerative; while certainly idiots, about whose mancinism there is most agreement, are highly subject to squint—and to tubercle. Perhaps, then, the mancinism of these squinting tuberculous subjects is an additional mark of an originally imperfect physical condition. Also it would not be surprising if all ordinary squinters, tuberculous or not, are left-handed oftener than normal persons are.

general, is probably not the case. Ogle, too, found mancinism to be proportionately twice as frequent in men as in women. My figures for non-squinting consumptives point in the same direction.

These tentative conclusions forestall somewhat the answer to the larger question that now comes up for consideration, which is, namely :—

What kind of inferences is one entitled to draw as to a causal connexion between strabismus and phthisis ?

First, of course, it is impossible to conceive how any simple ocular defect, short of blindness, can of itself favour the development of pulmonary tuberculosis, even in the most indirect way. Again, since these subjects' squint long preceded clinical manifestations of tuberculosis, it is unlikely to have been caused by that disease in any declared form. Ophthalmological works do not describe concomitant strabismus ever following tuberculosis. For this causal sequence to happen, necessary postulates are early tuberculous infection, early interference with one single nervous function (the fusion faculty of vision or kindred function), and then complete latency for some, perhaps thirty, years. But this, namely that squint is a rare initial manifestation of infantile tuberculosis or tuberculo-toxæmia, is of course an explanation that is supposititious in the highest degree.

More profitable, perhaps, than similar construction of hypotheses is consideration of the data we possess as to the special incidence of squint. Light may be thrown thus upon the particular association we are studying. Squint is well known to be common in the insane, especially in idiots, just as, by the way, tuberculosis is.

Marie (1), in a comprehensive article on the stigmata of physical degeneracy characteristic of those of unsound mind, writes :—

Il faut citer aussi le strabisme . . . le plus souvent il est fonctionnel, lié à l'état de la réfraction. Le strabisme convergent est le plus fréquent et généralement en rapport avec l'hypermétropie.

Crzellitzer (2), a Berlin ophthalmologist, has found that

1. Marie : *Traité International de Psychologie pathologique*, t. 1, p. 211.

2. Crzellitzer : *Zeitschrift f. Sexualwissenschaft*, February 1915, S. 414, 417.

almost 6 per cent. of cases of squint come from consanguineous marriages, and remarks further:—

Und zwar ist die Korrelation zwischen Idiotie, Taubstummheit, Schielen eine doppelte, einmal finden sich diese Affektionen sehr oft nebeneinander in ein und derselben Familie, also z. B. der Vater schielt und eines der Kinder ist idiotisch, oder ein Bruder taubstumm, ein anderer schielt; andererseits, kommen sie auch häufig bei einem und demselben Individuum vor, so dass jedem Irrenarzt geläufig ist, wie viele seiner Idioten zugleich schielen.

Féré (3) describes squint as common in neurotic families, and Trélat (4) as one of the developmental defects associated with albinism.

Nettleship (5) says that albinos very often suffer from squint, more often the divergent form. In this monograph Figs. 36, 75, 84, 132, 161, 639 (of albinos of all nationalities) show strabismus plainly; probably many more would, too, if their photophobia had allowed them to keep their eyes open. It is also common in the normals in albinotic families (which shows there is more concerned than the defects of the albinotic eye). The proportion in albinos alone is very large, i.e. at least 27 in 414 cases, apparently.

Squint, then, appears to be sometimes a mark of mental deficiency, or of a tendency, personal or familial, to certain bodily anomalies or malformations. In Part I we saw some grounds for supposing somewhat the same thing of ichthyosis, and indeed of phthisis too. Like a xeroderma insufficient to favour tuberculous infection *trans cutem*, squint probably merely indicates, in certain instances, the presence of predisposition to tubercle—clinical pulmonary tubercle—without itself forming an active constituent of a phthisical diathesis. Such active constituent may be some associated malformation, of which squint is the stigma. As we shall see, in ichthyotic consumptives nasal defect is common. However, the malconformation may be of any

3. Féré: *La Famille névropathique*, 2nd ed., 1898, p. 195.

4. Trélat: Art. "Albinisme," *Dictionnaire Encyclopédique des Sciences Médicales*, t. ii., 1865, pp. 403, 409. Cited by Féré, loc. cit.

5. Pearson, Nettleship, and Usher: *A Monograph on Albinism in Man*, Series VI and VIII, 1911 and 1913.

of several systems, e.g. of the lymphatics. In Parts III and IV we return to consideration of these questions. Sufficient, meanwhile, to record that, according to our findings on our evidence, there is undoubted association between concomitant strabismus and consumption, of predisposition to which latter disease squint forms a sign.

PART III

CONSUMPTION AND
NASAL ABNORMALITY (NON-TUBERCULOUS)

GIRL, AGE, 12, WITH OZENA AND RIGHT-SIDED PULMONARY PHthisis.

Note emaciation of the head free shawl of ozena with the shrunk drooping eyelids mentioned (no approximation of drooping scapula to spine).
This is a case of the tubercular type of ozena. Removal of the skin source of film
types of phthisical physique. The two contrasts must by no means be identified, however.



CHAPTER I

THE LITERATURE

To clear the ground, one might say first of all that one has nothing to do here with all those communications primarily concerned with some part of Waldeyer's ring or of the neighbouring mucous membranes as a portal of entry of the tubercle bacillus or as the site of tuberculous changes. The abnormalities we are to consider are *non-tuberculous*.

These reservations made, the writers dealt with had better be divided into two classes; firstly, those whose findings can be seen to have reference to the association under notice, or making allusions to it—in short, writers affording indirect evidence; secondly, those who have worked at the subject consciously and expressly. Since chronological order is the best one, and the former class dates from further back* than the latter, it will be given first.

Thus Piorry (1) wrote:—

Cependant un grand nombre des affections du larynx, des bronches et peut-être des poumons, commencent souvent par les cavités du nez.

And again with more particularity, laying it down that chronic nasal obstruction is apt to be followed by hæmop-

* The length of this study, and the toil of its readers, need not be increased through a search into remote medicine. Really useful contributions to the study of our subject, seeing its nature, cannot be much earlier than modern laryngology.

1. Piorry: *Traité de Médecine pratique*, 1843, t. iii., "Monographies," pp. 2 and 8,

tysis (although the reason he gives for the sequence is not the one we reach later) :—

Ultérieurement aux rhino-sténosies, et lorsqu'elles ont longtemps duré, il peut se manifester des accidents graves du côté des poumons, tels que des pneumohémies, etc., et ces états pathologiques sont les conséquences de la difficulté que le malade éprouve du côté de la respiration.

Galton and Mahomed (2), in a photographic study of the physiognomy of phthisis, wrote :—

. . . these (projecting ears) taken together [with a narrow mouth, often open, a short and small chin, a small and narrow lower jaw, make together an often-recurring face in phthisis.

Again, the commonly stated characteristics of the *habitus phthisicus* have long included a disposition to epistaxis and to catarrhal laryngitis. Thus a well-known general physician like v. Ziemssen (3), for instance, spoke of “die Neigung zu Nasenbluten, zu catarrhalischen Entzündungen des Kehlkopfes.” Epistaxis and catarrhal laryngitis are of course common accompaniments also of simple nasal defect. Similarly, a classical characteristic of scrofulous patients is catarrhal rhinitis and *eczema introitus narium*.

Cleland (4) considered the nasal obstruction of children produced by hypertrophic rhinitis a frequent cause of pulmonary disease.

Hajek (5) stated that of 33 bodies in which anterior perforating ulcer of the septum (the ‘traumatic’ ulcer, due primarily to simple dry rhinitis) was found, only two did not suffer from pulmonary tuberculosis.

Ziem (6), a Danzig laryngologist, had encountered many consumptives who were being regularly injected with

2. Galton and Mahomed: *Guy's Hospital Reports*, 1881, 3rd series, vol. 25, p. 487.

3. v. Ziemssen: *Klinische Vorträge*, 1887, 8 Vortrag, S. 8.

4. Cleland: *The American Lancet*, February 1888. Analysed in *Revue hebdomadaire de Laryngologie, d'Otologie, et de Rhinologie* (hereinafter cited as *Revue de Moure*), 1888, No. 11.

5. Hajek: *International klinische Rundschau*, 1889. Cited by Ribary, *Archiv f. Laryngologie*, 1896, Bd. IV, H. 2.

6. Ziem: *Berliner klinische Wochenschrift*, 1891, No. 24, S. 593, 2.

tuberculin, but whose chronic mouth-breathing and purulent nasal discharges had not been looked to at all. He considered this bad treatment.

There comes next evidence of a particularly valuable kind, since, being largely unconscious, it is likewise free from any bias. Various rhinological writers have investigated departments of their subject by examining the nasal cavities post-mortem on a series of subjects drawn from the deadhouse of a general hospital. Certain of them have recorded their procedure fully, and since tuberculosis is a frequent cause of death, it becomes possible by looking through their protocols to compare the frequency of simple nasal abnormality in the tuberculous and in the non-tuberculous.

Harke's (7) cases numbered over 400. His protocol includes, however, only those 'mit bemerkenswerthen pathologisch-anatomischen Befunden' as regards nasal condition, so that the comparison between tuberculous and non-tuberculous is a severe test, since none of the non-tuberculous can have a quite normal nasal condition. There are 164 entries on the protocol. If we exclude children under six years of age, and one or two cases of which full details are not given, 104 remain. Of these 104, 42 were tuberculous, 62 non-tuberculous. The comparison in respect of the more important nasal anomalies, lesions independent of agonal changes, works out as follows, the figures standing for percentage frequencies :—

| | Tuberculous. | Non-tuberculous. |
|-------------------------------|--------------|------------------|
| Septal deformity | 30 | 22 |
| Atrophic conditions | 14 | 11 |
| Hypertrophic rhinitis.. | 16 | 8 |

Schönemann's (8) 83 autopsies were made in order to elucidate the etiological bearing upon ozæna of metaplasia

7. Harke : *Beiträge zur Pathologie und Therapie der oberen Atemwege*, Wiesbaden, 1895.

8. Schönemann : *Virchow's Archiv*, 1902, Bd. 168, H. 1.

of the epithelium lining the nasal cavities. However, the evidence we get from him is not quite so unprejudiced as that from Harke, because he did remark, parenthetically, the preponderance amongst those who had died of consumption of narrowness of the nose (leptorrhinia), of turbinal atrophy, and of metaplasia. Septal deformity—to a slight degree, 19 per cent. as against 16 per cent.—may be added, although with hypertrophic rhinitis matters were reversed. But amongst the tuberculous subjects leptorrhinia was nearly twice, and atrophy nearly half again, as common as in the remainder.

Passing from the examination of these autopsy records, we find that Sticker (9), when on the subject of atrophy and xerosis of the membranes of the upper respiratory tract as an indication of various constitutional diseases, mentions among the latter pleurisy and pulmonary tubercle. He says the atrophy in question begins in the nose.

Talbot (10) stated that—

persons with long, thin noses, arrested nasal cavities, sunken faces (as a result mouth-breathers), and with contracted chest walls, are the subjects for tuberculosis;

and elsewhere, describing four mouth-breathers who showed dental irregularity plus intra-nasal defects:—

Three of these persons are now infected with tuberculous deposits. . . . Parents who have children possessing the somatic conditions here noted should pay particular attention to early hygienic welfare.

Blumenfeld (11), writing on the phthisis of diabetics and quoting Sticker's paper just mentioned, said that he found atrophy and inflammation of the air passages not rarely in ordinary diabetics, but almost without exception in diabetics who are also consumptive.

9. Sticker : *Deutsches Archiv f. klinische Medizin*, 1896, Bd. 57, H. 1.
10. Talbot : *Degeneracy, its Causes, Signs, and Results*, London, 1898, p. 194. *Irregularities of the Teeth*, 5th ed., p. 197.
11. Blumenfeld : *Therapeutische Monatshefte*, February 1899.

Turban (12), the well-known phthisiologist, mentioned as a common fallacy in the physical examination of consumptives an auscultatory sign (diminution of breath sounds) really due to obstructed nasal respiration, in which case it disappeared when the patient breathed by the mouth.

Cornet (13) found that in exposing guinea-pigs to inhalation of pulverized tuberculous sputa, one half of those made to breathe through the mouth showed tuberculous changes in the cervical lymphatic glands, but only one-fifth of those breathing naturally, i.e. through the nose. Further, the tuberculous infection of the former class was more serious, comprising oftener tubercle of the liver and spleen. In another experiment the nose-breathers remained healthy, whilst two of the mouth-breathers showed tuberculosis of the cervical and bronchial glands, with isolated pulmonary foci.

Recently, one must add, this conclusion has been traversed by Finder and Rabinowitsch (14), who, working similarly, found no difference as regards tuberculous infection between guinea-pigs breathing normally and those whose nostrils had been sealed. They deprecated, however, the application of their results to the question of tuberculous infection of human subjects.

Kreilsheimer (15) described control of cough in pulmonary tuberculosis by means of endonasal cocaineization.

Siebenmann (16), who inspired Schönemann's paper afore-cited, inferred from the findings in a series of nasal autopsies made by another pupil (Minder by name), that a narrow nose or a narrow type of face preponderated amongst tuberculous subjects, constituting perhaps an element in the phthisical habitus.

12. Turban: *Beiträge zur Kenntnis der Lungentuberkulose*, 1899.
13. Cornet: *Berliner klinische Wochenschrift*, 1899, Nr. 11.
14. Finder u. Rabinowitsch: *Berliner klinische Wochenschrift*, 1914, Nr. 46.
15. Kreilsheimer: *Medizinisches Correspondenz Blatt des Württembergischen ärztlichen Landesvereins*, 23 November 1901.
16. Siebenmann: *Verhandlungen der Gesellschaft deutscher Naturforscher und Aerzte*, 73 Versammlung zu Hamburg, 1901, S. 367.

According to Pasmanik (17), who gives no reference, Tröltzsch wrote to this effect:—

Ceteris paribus, de deux tuberculeux, celui qui vivra le plus longtemps sera celui chez lequel la respiration nasale est complètement libre, autrement dit dont le catarrhe chronique nasale a été bien traité.

De Laval (18) remarked catarrh of the respiratory nasal passages and nasal obstruction as being common in the tuberculous, whose frequent asthma and cephalalgia might often be traced to some abnormal intra-nasal condition. Tuberculous patients were likewise much affected in the autumn by the pollen of *Hydrastis Canadensis*.

Harland (19), the then laryngologist to a well-known American anti-tuberculosis institute, reported that "chronic rhinopharyngitis (non-tuberculous) . . . was present in nearly all cases."

Bezançon (20) wrote in a study of the thoracic conformation of consumptives:—

Ainsi les prédisposés par leur thorax mal conformé seraient non seulement en leur qualité de dystrophiques héréditaires (L. Landouzy), les tuberculeux héréditaires, mais tous ceux chez lesquels des causes congénitales d'obstruction des voies respiratoires, des causes accidentelles (trachéotomie, végétations adénoïdes, etc.), des arrêts de développement ou des troubles de croissance, amènent ce rétrécissement du champ respiratoire.

Jacquet (21), in a paper entitled "L'Avenir des Tuberculeux guéris," said that the recovered consumptive is liable to acute bronchitis, chiefly because his nasopharynx and upper respiratory passages are affected with chronic inflammation.

According to Parker (22), the children of tuberculous parents are especially liable to acute rhinitis.

17. Pasmanik : *Revue médicale de la Suisse Romande*, February 1903.
18. De Laval : *Congrès des Médecins de Langue Française de l'Amérique du Nord*, 1906. (Archambeault & Cie.)
19. Harland : *Annual Report of the Henry Phipps Institute of Philadelphia*, 1906.
20. Bezançon : Thèse de Paris, 1916.
21. Jacquet : *La Revue internationale de la Tuberculose*, November 1906.
22. Parker : *The Nose and Throat*, London, 1906.

Willis Anderson (23) emphasizes in a general way the importance of rhinological treatment of patients with incipient tuberculosis.

Lastly, a little out of chronological order for the sake of compactness, there has to be considered evidence bearing upon a connexion between tuberculosis and atrophic rhinitis.

* * * * *

Former ideas upon the subject of *rhinitis atrophicans fætida* were vitiated by reason of its non-distinction then from the symptomatically similar condition caused by ulcerous syphilitic or tuberculous lesions in the nasal cavities. But both before and after its final, definitive separation—an event for which, according to German laryngologists, B. Fraenkel (24) is responsible—a connexion was traced between non-ulcerous ozæna and scrofula. The interpretation of this connexion has gradually changed. Very gradually, however, for Cornet (25) just lately showed himself practically at one with the teaching in Trousseau's (26) day, that "L'ozène est parfois une des manifestations de la scrofule," since it "s'observe en même temps que le gonflement de la lèvre supérieure, en même temps que des ophthalmies dites scrofuleuses." But among specialists that theory of causation has receded with time. Thus Schaeffer (27) gave a strumous origin for 99 out of 119 cases of ozæna. Moure (28) wrote in 1884 that atrophic rhinitis was frequent among scrofulous patients and that the scrofula caused the ozæna. Valentin (29) alluded to the possibility that ozæna, like lupus, to which it had

23. Willis Anderson: *Annals of Otology*, St. Louis, March 1907.

24. B. Fraenkel: Art. in *Ziemssen's Handbuch*, 1876, Bd. IV, H. 1.

25. Cornet: *Scrofulosis*, 2nd ed., 1912. Bullock's translation, London, 1914, p. 236.

26. Trousseau: *Gazette des Hôpitaux*, 28 February 1860. *Cliniques médicales de l'Hôtel-Dieu de Paris*, 1865, t. i. p. 544.

27. Schaeffer: *Monatsschrift f. Ohrenheilkunde*, 1881, Nr. 4. Cited by many authors.

28. Moure: *Recueils cliniques sur les Maladies du Larynx*, Paris, 1884, pp. 175, 190.

29. Valentin: *Correspondenzblatt f. Schweizer Ärzte*, 1887, Nr. 5.

many analogies, might be connected with tuberculosis. Jacques (30) too, recalling the theory revived by Michel and again by Grünwald, as to nasal sinusitis causing ozæna, said that while Brindel (to be presently mentioned) had brought out frequent coincidence of atrophic rhinitis with tuberculosis, yet that in making the former the antecedent and the latter the consequent he might well have been putting the cart before the horse; for ozæna could be looked upon as the result of the reaction of a scrofulous subject's nasal mucosa to the irritation set up by the purulent secretion from inflamed accessory sinuses. This is a step on the road to the outright (and once orthodox) position of Cozzolino, that ozæna was nothing but a scrofulide of the Schneiderian membrane. More recently, Castex (31) ascribed to tuberculosis an 'etiological influence' upon ozæna, finding a tuberculous history frequent in the relatives, and also that general anti-tuberculous treatment improved the nasal condition. More recently still, D. McKenzie, Mackeith and Wingrave (32) find strong connexion between ozæna and tuberculosis, and conclude tentatively, from the use of tuberculin on ozænatous patients, and from study of the acidfast bacillus mentioned by Alexander (see next chapter), that ozæna as seen in England is a manifestation of tuberculosis. Their communications are noticed further in Chapter V. The position of Morell Mackenzie (33) was a half-way one. He thought that scrofula probably produced a certain disposition to catarrh, but could not be said to produce ozæna.

But the hypothesis that atrophic rhinitis is the cause of the tuberculosis found along with it has with time been more and more supported. Strübing (34) inclined to

30. Jaques: *Revue de Moure*, 19 August 1899.

31. Castex: *Revue de la Tuberculose*, October–December 1905.

32. D. McKenzie, Mackeith, and Wingrave: *Journal of Laryngology*, London, May, June, and July 1916.

33. M. Mackenzie: *A Manual of Diseases of the Throat and Nose*, London, 1884.

34. Strübing: *Münchener medizinische Wochenschrift*, 1895, Nrs. 39, 40.

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that view, granting that weakness, anaemia, chlorosis, scrofula, or tubercle often coincided with ozæna, but finding (unlike Castex) that nasal treatment of itself would improve the general health. This last is emphatically confirmed by Greville Macdonald (35). Schestakow's (36) conclusion was : "La tuberculisation est toujours à craindre chez les ozéneux." His cases numbered 28, of whom four had phthisis (one laryngeal); one the remains of right-sided pleurisy; while in very many of the remainder were to be heard disseminated pulmonary moist râles. Brindel (37) showed a case where ozæna had preceded phthisis by fifteen years, and drew the natural inference, adding that he had met with similar instances before. Ingals (38), who objected to the view that nasal defect predisposed to pulmonary tubercle (objections noticed in the next chapter), was inclined to make an exception in favour of atrophic rhinitis. Moure's early view we have seen. In a later communication (39), and in two pupils' theses discussed below, he modified them by separating off from atrophic rhinitis two 'pseudo' forms, differing but slightly, found respectively in strumous and in tuberculous subjects, and designated therefore "coryza pseudo-atrophique strumeux" and "coryza pseudo-atrophique tuberculeux." These are 'pre-bacillary'—appearing before, and predisposing to, the lesion due to the bacillus of Koch—yet have an evolution related to that of the latter very closely. To the separate consideration of this we shall return in Chapter V. Lack (40), although deeming improbable a high proportion of phthisis amongst the ozænaceous, thought that ozæna conduced to tubercle; and the editor of the last (1909) edition of Moritz Schmidt's well-known laryngological handbook

35. Greville Macdonald : *Diseases of the Nose*, London, 1892.

36. Schestakow : *Dissertation inaugurale de Genève*, 1894.

37. Brindel : *Revue de Moure*, 1896, vol. ii. p. 1147.

38. F. Ingals : *British Medical Journal*, 13 November 1897.

39. Moure : *Revue de Moure*, 3 October 1903.

40. Lack : *Diseases of the Nose*, London, 1906.

supports him. In Lockard's (41) work the conclusion that ozæna predisposes to tuberculosis is described as irresistible. The author himself found 49 cases in 275 consumptives. Leroux (42), after considering diverse explanations of the association, decided on ozæna as the cause, and tuberculosis as the effect, as being most likely.

There are, then, those who have noted frequent coincidence of the two diseases, but without assigning priority or etiological influence to either; or else speaking doubtfully or giving some other explanation. Wingrave (43) obtained a tuberculous family history in 37 out of 60 ozænatous persons. V. Rimscha (44) described 38 cases of sinusitis and non-tuberculous intra-nasal caries, some of which presented the typical picture of ozæna. There was tuberculous family history in the majority, while in some he suspected personal phthisis; in one woman it was so advanced as to contra-indicate a nasal operation. Hamilton (45) found consumption in 6 out of 170 subjects of ozæna. Pluder (46) in a discussion said he had often found in families with hereditary tuberculosis part of the children with adenoids and part with ozæna. The dictum of Chauveau (47), president of a tuberculosis congress at Paris, was that the consumption of ozænatous subjects is very chronic in its course. Cholewa and Cordes (48) said that in a whole series of cases of ozæna they had encountered a history of the parents dying of pulmonary affections. Noebel and Lohnberg (49), describing a family affected with ozæna and nasal sinusitis, remarked that the mother could not be operated upon, it being discovered that she had advanced phthisis.

41. Lockard: *Tuberculosis of the Nose and Throat*, St. Louis, 1909.

42. Leroux: *Presse Médicale*, 9 November 1912.

43. Wingrave: *Medical Press and Circular*, 1893, lvi. (But see reference 32.)

44. V. Rimscha: *Petersburger medizinische Wochenschrift*, 1895, Nr. 52.

45. Hamilton: *Transactions IV International Medical Congress*, New Zealand, 1896. Cited by many authors.

46. Pluder: 68 Versammlung deutscher Naturforscher und Aerzte zu Frankfort, September 1896.

47. Chauveau: Cited by Ducos; *Thèse de Bordeaux*, 1905.

48. Cholewa u. Cordes: *Archiv f. Laryngologie*, 1898, Bd. VIII.

49. Noebel u. Lohnberg: *Berliner klinische Wochenschrift*, 1900.

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Siebenmann (*loc. cit.*) wrote that the variety of ozæna showing epithelial metaplasia and complicated with sinusitis was mostly found in tuberculous individuals. Grünwald (50) thought that constitutional weakness such as that found with familial history of tubercle both predisposed to, and could be caused by, nasal sinusitis, in his view the sole cause of ozæna. Caboche (51) obtained a tuberculous family history from 16 out of 28 cases of ozæna, two of which were themselves tuberculous. Animal inoculations of pieces of the atrophied turbinals proved negative. He quoted Delacour (*Le Syndrome Adenöïdien*, Paris, 1904) for heavy infantile mortality from tuberculous meningitis amongst collaterals of the subjects of adenoids, ozæna, and rhinitis. Bilancioni (52) found positive Pirquet reaction in at least 35 per cent. [no great frequency] of ozæna cases. He considered the disease rare in connexion with recent tuberculosis of lungs or larynx, although tuberculous infection might occur, as by spread of the ozæna to the larynx and trachea, or by its inducing sclerotic changes in the bronchi and lungs. Writing on the selection of consumptives for sanatorium treatment, Kaurin (53) mentioned ozæna as a contra-indication. Caldera (54) reported that of 60 ozæna patients, 14, or 23 per cent., reacted to the intradermal test with tuberculin.

Those who have denied any significant connexion of the two diseases seem to be only four in number.

Gottstein (55) professed ignorance that consumptives are distinguished by liability to nasal disease. Krieg's article on ozæna in the 1899 edition of the well-known *Heymann's*

50. Grünwald: *Archiv f. Laryngologie*, 1902, Bd. XIII.

51. Caboche: *Annales des Maladies de l'Oreille, du Larynx, du Nez, et du Pharynx*, September 1907.

52. Bilancioni: *Verhandlungen der Nasen-, Hals-, und Ohrenklinik der Universität Rom*, 1913. Analysis in *Centralblatt f. d. g. Tuberkulose-Forschung*, January 1915, S. 6.

53. Kaurin: *Med. Revue*, May 1914, pp. 257-64. Analysis in *Centralblatt f. d. g. Tuberkulose-Forschung*, October 1914.

54. Caldera: Reference in *Revue de Mure*, 15 June 1916.

55. Gottstein: *Breslauer aertzliche Zeitschrift*, 1879, Nrs. 17, 18. Cited by M. Mackenzie and by Alexander.

Handbuch contains no mention of a tuberculous tendency. Demme (56) had only sometimes seen tubercle with ozæna, and looked upon it more as a complication than as intimately connected; while Slavtcheff (57), in a Toulouse thesis, quoting his master Escat in corroboration, denied (forgetting, for one instance, work so near at hand as that already cited from Bordeaux) that ozæna had ever been recorded with laryngeal tubercle.

But the weight of evidence is obviously against these, and a significant testimony comes from the communications of those who, investigating ozæna post-mortem, recorded the causes of death of their subjects.

Hartmann's case (58) died of phthisis; so did three out of Fraenkel's four (59).* In a later paper there is an ozæna patient mentioned who died of caries of the sacrum, a woman aged fifty-seven. Gottstein's (*loc. cit.*) one died of cheesy peribronchitis, a diagnosis which at that date suggests tubercle, especially when one remembers recent radiological work on tuberculous peribronchitis. In Krause's (60) two, the causes of death were respectively hepatic cirrhosis and a complication of diseases which included caries of the spine; this latter had also extensive but obsolete pulmonary apical tuberculosis. Harke (*loc. cit.*) protocolled five cases of outright rhinitis atrophicans foetida: three had phthisis. Schönemann (*loc. cit.*) one, with hepatic cirrhosis. Minder (61) autopsied five, all tuberculous patients. In Schestakow's (*loc. cit.*) case Bright's disease was the cause of death. Alexander (*loc. cit.*) states that Wertheim (62) told

56. Demme: *Deutsche medizinische Wochenschrift*, 1891, Nr. 46.

57. Slavtcheff: *Thèse de Toulouse*, 1907.

58. Hartmann: *Deutsche medizinische Wochenschrift*, 1878, Nr. 13.

59. E. Fraenkel: *Virchow's Archiv*, 1879, Bd. 75, and 1882, Bd. 87. *Idem*, Bd. 143.

* Fraenkel's fifth case is excluded because it was syphilitic; and although it would seem *a priori*, as will be argued later, that an ozænaceous condition however produced should conduce to tubercle, yet for the moment we are considering only atrophic rhinitis.

60. Krause: *Virchow's Archiv*, 1881, Bd. 85.

61. Minder: *Archiv f. Laryngologie*, 1901, Bd. XII.

62. Wertheim: *Archiv f. Laryngologie*, 1900, Bd. XI.

him in a private letter that two of his five ozæna cases had phthisis. In sum, out of 26 with ozæna, the number with fatal tubercle is certainly 14 (53 per cent.), and probably 16, or a percentage of 61. As these figures come from German sources, it will be useful to compare with them Kayserling's statement at the 1905 Tuberculosis Congress at Paris that a third of all the deaths in Germany were due to tubercle. The above evidence seems to show, then, that the subjects of ozæna have, in Germany at any rate, a good deal bigger tuberculous mortality than the general population has.

Thus, post-mortem too, tuberculosis seems to account for more than its share of ozænatous patients. In some way the two diseases must be associated: that matter is proved. The proof receives indirect corroboration when we turn, as now, to look at the contributions of the scattered few eccentric enough to think of regularly examining consumptives' noses.

CHAPTER II

LITERATURE (*Continued*)

THESE contributions seem to begin with that made in 1885 by a New York professor, Chapman Jarvis (63). Jarvis quoted no corroboration, giving as his *Orientirung* that while studying the causes and complications of nasal disease he had had his attention attracted to the co-existence of bronchial with nasal catarrh, and later to the association of nasal disease with pulmonary phthisis. The simple chronic laryngitis common in consumptives he referred to the laryngeal irritation set up by mouth-breathing and by contact with backward flowing nasal mucus, blocked from its proper course by anterior nasal obstruction. He quoted four cases of consumption (the third one complicated with laryngeal tubercle) in which the nasal abnormalities were, respectively, double atrophic rhinitis; unilateral atrophy with obstruction on the other side from septal deviation; and (in both third and fourth) hypertrophic rhinitis. In all the nasal history long preceded the pulmonary one. In the last two the nasal mucosa was unusually pale. On the second and fourth cases he did a nasal operation, with a good result. He concluded that such was indicated both in cases actually consumptive and as a prophylactic in the non-tuberculous. Thus he rectified the deviated septum of the son of case 4. Deviated septum he considered to be often hereditary.

63. Chapman Jarvis: "Catarrhal Affections of the Nasal Passages as a Cause of Pulmonary Phthisis, with special reference to the question of heredity," *New York Medical Journal*, 5 September 1885.

Solly (64), who saw many consumptives at Colorado Springs, brought forward reports of 200 unselected patients, of whom 28 per cent. had nasal disease. As to its character he said: "Of the nasal cases it is hard to determine how many were tuberculous; only a very few were noted as positively tuberculous, and probably not many more were so, confirming the opinion of most rhinologists that nasal tuberculosis is comparatively rare." The nasal lesions noted are septal deformity, which was the common cause of obstruction, turbinal hypertrophy, adenoids, polypi, and "an ulceration simple or tuberculous." A kind of naso-pulmonary symmetry was described, in that where the nasal disease was, say, on the right side, the right lung was chiefly affected, and *vice versa*. The 'practical relation' of the nasal to the lung affection was considered to lie 'in causing mouth-breathing and so catching cold, in diminishing pulmonary expansion and complete aeration.' Rhinological treatment, including operative, was recommended. Solly did not allude to Jarvis.

Grelische (65) communicated two cases of coincidence of pulmonary tuberculosis with non-tuberculous nasal defect; one was ozæna and the other 'suppurative rhino-pharyngitis.' In both nasal treatment improved the lung condition as well as the nose.

Clark (66), quoting no one, took 100 consumptives drawn from the throat and other departments of hospitals in Boston and Massachusetts, and compared their nasal condition with that of 100 out-patients suffering from affections unconnected with nose, throat, or lungs. His results may be summarized in the table on the next page, the figures denoting percentage frequencies.

In order to find out if the nasal atrophy generally preceded the pulmonary affection, or whether it was a

64. S. E. Solly: "The Relation of Chronic Nasal and Laryngeal Diseases to Pulmonary Tuberculosis," *Journal of the American Medical Association*, September 1894.

65. Grelische: *Les Infections d'origine nasale*, Thèse de Paris, 1894.

66. Payson Clark: "The Condition of the Nose in Phthisical Patients," *Boston Medical and Surgical Journal*, 3 October 1895.

consequence of the anaemia of phthisis, he recorded from the anamnesis the duration of pulmonary symptoms. Thus of 21 patients with marked intra-nasal atrophy, in 10 pulmonary symptoms had been noticed for less than two years; and in 32 with moderate atrophy, there were similarly 20. Since turbinal atrophy is a slow process, he concluded that in general it antedated the chest affection. He recommended routine examination of the nose in pulmonary tuberculosis, and also rhinological treatment.

Ingals (67), who was mentioned in the preceding chapter, animadverted upon Solly's views, putting forward

| | | | Phthisical. | Control. |
|------------------------------------------|----|----|-------------|------------|
| Normal turbinals | .. | .. | 27 | 56 |
| Hypertrophy of turbinals | .. | .. | Not stated | 1 |
| Slight atrophy | .. | .. | 20 | 25 |
| Moderate atrophy | .. | .. | 32 | 17 |
| Marked atrophy | .. | .. | 21 | 1 |
| Slight obstruction from septal deformity | .. | | 32 | Not stated |
| Marked obstruction from septal deformity | .. | | 16 | 0 |

the following argument. In 830 consumptives stated to have been examined, but of whom no protocol is given, the percentage with nasal defect he put at 28. In place of taking an actual control of non-tuberculous persons, he estimated the prevalence of nasal defect in the general population by the following calculation. Delavan, he recalled, found that about half of several thousand skulls showed more or less septal deformity; to this proportion Ingals added an estimated 25 per cent., to represent the subjects of nasal catarrh, and arrived thereby at the conclusion that three-quarters of the community have intra-nasal trouble, while little more than a quarter of

67. Fletcher Ingals: "The Relation of Nasal Disease to Pulmonary Tuberculosis," *British Medical Journal*, 13 November 1897.

consumptives suffer in this way. Nevertheless, as already stated, he thought that ozæna might predispose to tubercle. There is evident, of course, besides the speculative line of argument, the double fallacy of comparing one observer's estimate of a frequency *in vivo* with that made by another on the dried specimen.

Liaras' (68) thesis is the first occasion of Moure's putting forth his new conclusions, and the order in which the observations are set out may show how he came to them.

The first group of cases comprises facial and intra-nasal lupus, with associated or antecedent intra-nasal lesions not actually lupic but chiefly atrophic in nature or else purulent rhinitis. Next come cases of scrofula, also with these same intra-nasal appearances, the (more common) atrophy being taken to be the end stage of the well-known purulent catarrhal rhinitis so familiar in scrofula. The following findings are then given: (a) four instances of turbinal atrophy coinciding with laryngeal or pulmonary tuberculosis. (b) In 75 other tuberculous subjects, 44 with some grade of endonasal atrophic change, tubercle bacilli never being present in the nasal secretion, animal inoculation of which too gave negative results. With praiseworthy caution these negative results are not taken as conclusive, because in the first place only subcutaneous inoculation was employed, not (this being before the days of anti-formin) intra-peritoneal; and secondly because with undoubtedly lupic material inoculated as a control a similar failure was encountered. (c) In 210 cases of laryngeal phthisis, 34 with atrophic rhinitis, only two of these being outright ozæna; in all 34 the nasal lesion seemed either previous to, or contemporary with, the pulmonary one. (d) No consumption in 50 other cases of ozæna, which latter affection was therefore not deemed specially to predispose to tubercle. Liaras quoted Jarvis and Grelische.

68. Liaras: *L'Infection tuberculeuse par la voie nasale*, Thèse de Bordeaux, 1899.

Mignon (69) found constantly in several hundred tuberculous patients passing through a convalescent home post-nasal catarrh, often accompanied by nasal obstruction. He considered these conditions to precede, and to predispose to, tubercle, and that in non-tuberculous subjects the danger of tuberculous infection is increased by inadequacy of the physiological nasal function, as in catarrhal and atrophic rhinitis; or by insufficient permeability of the nasal fossæ, as in hypertrophic rhinitis, septal deviations, tumours, etc. He advised rhinological treatment as prophylactic, and as a means to cure, of tubercle. No corroboration is quoted.

Freudenthal (70), similarly quoting no one, found in 110 American sanatorium patients 43 with either rhinitis sicca or some grade of intra-nasal atrophy. He considered that these conditions were conduced to by the central stove heating customary in America, since they were commoner in patients in residence at the end of winter than in the summer patients. His theory of phthisiogeny in these cases is an adaptation of E. Fraenkel's idea of a tuberculous nidus in the naso-pharynx. Atrophic and dry states of the nose cause post-nasal catarrh. The viscous muco-pus thus produced in the naso-pharynx entangles aerogenous tubercle bacilli brought by the inspiratory air-stream, and these multiply until numerous enough to traverse the intact mucous membrane, leaving no trace of their passage. The practical conclusion drawn is that rational treatment of consumption must begin with the upper air-passages.

Alexander (71), in an outstanding study, quotes all the papers mentioned so far in this chapter save Mignon's

69. Mignon: "Rôle des Fosses nasals dans le traitement et la Prophylaxie de la Tuberculose pulmonaire et laryngée," *Presse Médicale*, 4 January 1902, and *Archives internationales de Laryngologie*, 1902, No. 2.

70. Freudenthal: "Lungentuberkulose und Erkrankungen der Nase und des Rachens," *Brauer's Beiträge zur Klinik der Tuberkulose*, 1903, Bd. II, H. I.

71. Alexander: "Die Beziehungen der Ozaena zur Lungentuberkulose, nebst Bemerkungen über die Diagnose der Ozaena," *Archiv f. Laryngologie*, 1903, Bd. XIV, H. I.

and of course the preceding one. His investigation was directed to the relations between ozæna and tuberculosis, and the bearings of any such relation upon the etiology of the former disease. First he gives from rhinological literature a table of recorded autopsies on ozæna patients —in three-fourths the cause of death was pulmonary tubercle. He examines nasally 200 consumptives, finding amongst them 1 case of outright ozæna; 6 that looked like ozæna cured in the clinical sense of the word; 13 of marked, and 12 of moderate intra-nasal atrophy, of which respectively four and seven might be attributed to the wasting influence of consumption. A full protocol is given of the last 89 cases examined, and the proportion showing some kind of nasal abnormality, not necessarily atrophic in nature, is 64 per cent.; this, too, when septal deformity has been excluded from the reckoning. He is unable to confirm Solly's naso-pulmonary symmetry [so too this writer]. The investigation contains two further stages. Firstly, in 50 ozæna cases uncomplicated with sinusitis he finds 4 with tubercle bacilli in the sputum, and 18 to be diagnosed as phthisis from the evidence of pulmonary physical signs; a further 7 were on the same grounds suspicious. Lastly, he gives conclusions from his bacteriological examination of these last 50 ozæna patients. He warns against making a diagnosis of tuberculosis from simple examination of their sputum, since they often have in their nose, and may have in other parts of the upper air-passages, acidfast bacilli very like the bacillus of Koch, but with quite other cultural characteristics. Ozæna, he thinks, although not over common in phthisis in its pronounced form (this, as D. McKenzie points out, is not a correct inference from his figures), undoubtedly confers predisposition to pulmonary tuberculosis.

Moeller and Rappoport (72), to whose sanatorium at

72. Moeller u. Rappoport: "Über die Beziehungen der nichttuberkulösen Erkrankungen der oberen Luftwege zur Lungen-tuberkulose," *Zeitschrift f. Tuberkulose*, 1903, Bd. IV, H. 5.

Belzig Alexander had gone for cases, examined 120 consumptives (but apparently not post-rhinoscopically), finding the following percentage frequencies of non-tuberculous abnormality:—

Nose, 84; pharynx, 76; larynx, 42; and ears, 26.

They drew attention to the gradation of these figures, indicating that the incidence of disease fell from without inwards, i.e. in a direction corresponding to the course of the inspired air. Septal deformity was noted as the commonest of the nasal defects; which conduced, they thought, to pulmonary tubercle. Bacteriologically they found more colonies develop in plates from the secretion of abnormal noses than from that of healthy ones, while the commonest micro-organism in the atrophic cases was Friedländer's bacillus, tubercle bacilli being absent throughout. Rhinology was recommended as of high importance in the prophylaxis and treatment of consumption.

Moure (73) in a communication to a congress at Madrid, gave a résumé of his views. "Coryza pseudo-atrophique strumeux" is found in strumous adolescents, above all in lupus of the face or as the first stage of lupus of the Schneiderian membrane. Its characters are turbinal atrophy, with thin, yellowish, non-fœtid crusting. It is a constitutional, autochthonous, and even hereditary rhinopathy.

The one and only text-book reference (74) to the subject under notice which is extant occurs in Schröder and Blumenfeld's handbook on the therapeutics of consumption. Blumenfeld, a laryngologist in charge of the throat department at a sanatorium, quoted as regards atrophic conditions the papers of Alexander and of Moeller, being inclined himself, however, as indicated in a paper of his

73. Moure: "Le Coryza atrophique: est-il une affection autonome?" *Revue de Moure*, 3 October 1903, No. 40.

74. Blumenfeld: Art. "Obere Luftwege" in Schröder u. Blumenfeld's *Handbuch der Therapie der chronischen Lungenschwindsucht*, 1904, Abt. III.

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cited in Chapter I, to refer this abnormality to a *xerosis*, or general state of dryness of the respiratory tract. (See Chapter VI.) Like Freudenthal, he follows in this Sticker (*loc. cit.*). Under nasal obstruction he mentions Solly, and advises appropriate rhinological treatment, condemning the galvano-cautery, use of which he had once seen give rise to a tuberculous ulcer, while on the contrary all cutting procedures had healed well. He had not, however, done resection of the nasal septum, and would only advise it in cured or very mild lung cases.

Behr's (75) article is reminiscent of those of Freudenthal, of Moeller, and of Blumenfeld (all of whom he quotes), except that the 300 patients examined were all in an early stage of phthisis and all males. The percentage frequencies of non-tuberculous abnormality found were:—

Nose, 50; pharynx, 38; larynx, 28;

the affections of the two latter regions being such as are usually found with nasal trouble. He thus confirms Moeller's finding; and also the seasonal variation (in German sanatoriums, by the way, and probably also in American ones on account of the severe winter, just as in Switzerland, windows are not kept open nearly as much as in English institutions) and the connexion with hot air and dust ascribed by Freudenthal. Rhinological treatment is strongly recommended as prophylactic and therapeutic of pulmonary tubercle.

A pupil of Moure is again concerned with the nasal condition of the tuberculous, but whereas Liaras' essay dealt mainly with scrofulous and lupic patients, that of Ducos (76) has most to do with consumptives. However, the 'coryza pseudo-atrophique tuberculeux' of Ducos differs very little from the 'coryza pseudo-atrophique strunueux'

75. Behr: "Die Affektionen der oberen Luftwege bei Phthisikern in die Anfangsstadien," *Brauer's Beiträge zur Klinik der Tuberkulose*, 1904, Bd. III, H. I.

76. Ducos: *Contribution à l'Étude des Cavités naso-pharyngiennes chez les Tuberculeux pulmonaires*," Thèse de Bordeaux, 1905.

of Liaras. The atrophy in the former case bears more upon the inferior turbinals, that is about all. The more advanced the tuberculosis, the greater the atrophy: in the early days of a consumption there may even be nasal obstruction, to be replaced later by atrophy. Ducos' findings may be summarized as follows:—

| | Pseudo-atrophic Rhinitis. | Other Nasal Affections. |
|---------------------------------------|---------------------------|-------------------------|
| | Per cent. | Per cent. |
| Pleurisy (17 cases) | 94 | 5 |
| Pulmonary tubercle (62 cases) .. | 85 | 24 |
| Extra-pulmonary tubercle (21 cases) | 25 | 8 |
| Non-tuberculous control (50 cases) .. | 14 | 10 |

This pseudo-atrophic rhinitis, an endonasal lesion which precedes the pulmonary tubercle and yet advances *pari passu* with it, forms part, he concludes, of a phthisical predisposition. He presses for rhinological treatment of consumptives. Ducos quotes Greliche, Brindel, Freudenthal, Kreilsheimer, Liaras, Mignon, Moeller and Rappoport, Mouré, Siebenmann.

Roblot and Lumineau (77) found in consumptive school-teachers many with non-tuberculous nasal obstruction and laryngeal catarrh. The nasal defects they noted in this order: Septal deviations, hypertrophic turbinates, nasopharyngeal polypi, and fibrous remains of adenoids with chronic post-nasal catarrh. No corroboration quoted.

Fetterolf (78), successor to Harland (*q.v.* Chapter I) described non-tuberculous nasal defect as frequent among the patients of a tuberculosis institute. In 198 of them without tuberculous lesion of the upper air-passages there were "23 cases of sclerotic and atrophic and 26 cases of septal obstructive conditions." Appropriate treatment

77. Roblot et Lumineau: "La Tuberculose chez les maîtres de l'enseignement primaire," *La Revue internationale de la Tuberculose*, November 1906.

78. Fetterolf: *Third Annual Report of the Henry Phipps Institute of Philadelphia*, 1907.

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is recommended, including operative when the pulmonary affection is quiescent.

Zickgraf (79), quoting Freudenthal, Moeller, Behr, and Blumenfeld, in the main confirms (apparently from subjective examination only) their conclusions. In his sanatorium there had been performed 84 operations on the upper air-passages, none with bad result. In a later paper, he finds high-arched palate on the whole common in consumptives, and connects this and the characteristically shaped phthisical thorax with nasal obstruction, although these skeletal changes are by no means to be taken as diagnostic of pulmonary tubercle.

Urbano (80), in a discussion at the third Spanish Congress of Oto-rhino-laryngology on the treatment of laryngeal tuberculosis, maintained the importance of nasal respiration as a means of prophylaxis of laryngo-pulmonary tubercle. He added that repeated observations had shown him that to re-establish permeability of the nasal passages notably improved the bacillary lesions below, as well as the general condition. No corroboration quoted in this or the following paper.

Jones (81) wrote:—

Our present purpose is not to enumerate the ordinary, well-known, and generally accepted classical symptoms of this condition [laryngeal tuberculosis], but to direct attention to two well-marked clinical symptoms observed in the examination of between five and six hundred men at the Metropolitan Hospital during a one year's service. . . . The first of these clinical symptoms to attract attention, on account of its frequency, was marked deviation of the nasal septum with spur or ridge, in many instances almost occluding the nasal fossa. This deformity, necessitating mouth-breathing and chronic catarrhal inflammation of the oro-pharynx, leads to the query: does this predispose to tubercular laryngitis?

79. Zickgraf: "Über die Komplikationen der Lungentuberkulose von seiten der oberen Luftwege," "Über die Brustmasse bei Menschen mit hohem, Spitzbogigem Gaumen," *Zeitschrift f. Tuberkulose*, 1909, Bd. XIV, H. 6, and Bd. XV, H. 2.

80. Villar Urbano: *Boletín de Laringología, Otorrinolaringología, y Rinología*, Madrid, May-August 1910, p. 73.

81. Jones: "Diagnosis of Tubercular Laryngitis," *Journal of Ophthalmology, Otology, and Laryngology*, New York, February 1911.

Wotzilka(82), in a communication from the oto-rhino-logical clinic of Prague University, found in 100 consumptives 45 with non-tuberculous nasal disease, as against only 13 in 100 non-tuberculous persons. Of the 45, 32 had nasal obstruction.

* * * *

The following observations suggest themselves upon the foregoing, the most important section of the literature:—

1. No other information as to the general nasal condition of the tuberculous, other than that given by this group of writers, exists.
2. The unity of conclusion: every writer save one either maintaining, or being impressed with the likelihood, that non-tuberculous intra-nasal abnormality is a fairly common predisposing cause of tuberculosis.
3. The frequency with which that conclusion has been arrived at independently—apparently as a spontaneous original observation—by authors separate both in time and country. As all who know medical—or, I suppose, any technical—literature will admit, this is important. Let but an observation by some worker of note be communicated and receive prominence, and numerous published corroborations of dubious value follow quickly. Unconscious agreement is much better evidence of the discovery of a fact.
4. None the less, some of the names quoted belong to those who have attained professional distinction. Jarvis was a New York professor of laryngology; Moure is the leading Latin laryngologist; Alexander was a prominent committee member of an international medical investigation; Blumenfeld is part editor of the fullest extant work on the therapeutics of consumption; Fetterolf obviously occupies a responsible position; Moeller's name is known in tuberculosis literature for work on the timothy grass bacillus.

82. Wotzilka: *Medizinische Klinik*, 1914. Cited by Finder and Rabino-witsch: *Berliner klinische Wochenschrift*, 16 November 1914.

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5. By one or other of these observers almost all the details of the clinical picture of nasal insufficiency have been noted in consumptives. Both obstructive and atrophic conditions lead to post-nasal catarrh and to pharyngitis; and several, such as Alexander and Mignon, describe these lesions along with pulmonary tubercle: also to simple laryngitis; and the evidence of Solly, of Moeller, and of Röblot may be quoted. Nasal obstruction in early life causes thoracic deformity; and Bezançon, Talbot, and Zickgraf speak of such in consumptives. The same nasal abnormality is associated with dental and palatal irregularities; and the particular case is described by Jarvis, by Talbot (a dental surgeon), and by Zickgraf.

6. The large number of communications from North America; partly, perhaps, because the climate of that country entails much indoor life and the use of central stove heating—conditions of life which of course aggravate the consequences of impaired nasal respiration.*

7. So that, lastly, it seems strange that the consensus of findings now unearthed, though out of the eagerly followed bacteriological line of research with its appertaining therapeutic possibilities, has nevertheless not already in some measure received “the *visa* of the text-books”—one likely reason for the omission being that our subject (as is the way with *Grenzgebiete*) falls between two stools; in the present instance those of current laryngology and current internal medicine.

* Post-nasal catarrh was once called “American catarrh.”

CHAPTER III

PRESENT INQUIRY: GENERAL REMARKS

THE short interim recapitulation given at the close of the last chapter showed, perhaps, that while our analectic method had revealed a good deal, nevertheless much more remained undefined. The study of this subject had been very little pushed; detailed systematic examination was wanting in most directions; and any practical application, as, for example, to the prophylaxis, diagnosis and treatment of tuberculosis, seemed nearly absent. The pre-requisite to further investigation was plainly an ample clinical material with a strictly comparable control of normals. For by the majority of the writers just quoted—by the majority of those of them who had got furthest in their research—it had been realized that the nasal abnormality of tuberculous subjects was heterogeneous, or at least divisible into two broad groups, viz., the obstructive group, where the nasal chambers for one cause or another were too narrow; and its converse the ‘atrophic’ group, where they were too wide. The material had then to be enough to afford plenty of each class for study and for comparison with the normal. Again, by the authors quoted the question of the sex-incidence of these nasal affections had not been raised. Accordingly, both the tuberculous patients and the control of normals had to include a sufficiency of each sex.

Other details upon which, as has been said, information was deficient, were of considerable interest and importance. Would, for instance, any especial relation appear as between nasal insufficiency and tuberculous affection of the

larynx? And, most important, would the findings resulting from inquiry directed to all such points tend to verification of the main hypothesis or to its disproof?

The fresh material gathered in fulfilment of these requirements consists of 500 unselected consumptives (all sputum-positive). It was necessary to take only sputum-positive consumptives in order to have certainty of diagnosis; and in particular because, as will be discussed more fully in Chapters IV and VI, there is reason to believe that some non-tuberculous nasal affections may set up non-tuberculous pulmonary ones, rather easily to be mistaken for consumption. Nearly all the cases were examined after the writer had held for a year the post of senior clinical assistant to a London throat hospital, and uniform case-sheets were used for all. They came from a consumption hospital, a sanatorium, and from two or three Yorkshire tuberculosis dispensary districts. The control of healthy normals, examined with a Cresswell Baber travelling throat-lamp, were similar in respect of age, social class, and employment. Three hundred and sixteen of their number lived in the same areas as the tuberculous patients (relatives of these latter being of course rejected), and readily came forward for examination on payment of a small fee. The remaining 136 were soldiers and sailors suffering from gonorrhœa, chancroid, accidents, and a few other non-tuberculous ailments, examined similarly at military and naval hospitals. The whole control thus numbered 452, and is obviously superior for the purpose to the hospital patients used as controls by Payson Clark and by Ducos.

The plan of investigation followed is that already adumbrated. Four classes* were formed, and four bundles of case-sheets made up as follows:—

1. Cases showing nasal obstruction and/or mouth-breathing.

* The qualifications given for these four classes were kept to as strictly as possible. Naturally, in a clinical investigation there were in each some borderline cases. However, all may be seen *in extenso* in the Protocol appended to Part IV of this book.

2. Cases of bilateral intra-nasal atrophy.
3. A slightly heterogeneous class; comprising unilateral atrophy or chronic rhinitis without nasal obstruction, rhinitis sicca, and a few doubtful cases.
4. Cases where the nasal condition seemed normal.

Crossing this classification there was the division by sex. The sub-totals thus obtained are, where possible, supplemented by similar figures obtained by analysis of the protocols to be found in the literature cited in the last chapter. The material thus reaches fairly large proportions.

The controls were similarly treated; and the broad results of the comparison came out:—

| | Normal Nasal Condition. | Pathological Nasal Condition. | Total. |
|--------------------|-------------------------------|-------------------------------------|--------|
| Consumptives | 156 | 344 | 500 |
| Control | 285 | 167 | 452 |

The material being divided according to sex, the further figures are:—

| | Normal Nasal Condition. | Pathological Nasal Condition. | Total. |
|--------------------|-------------------------------|-------------------------------------|--------|
| MALE. | | | |
| Consumptives | 117 | 242 | 359 |
| Control | 205 | 116 | 321 |
| FEMALE. | | | |
| Consumptives | 39 | 102 | 141 |
| Control | 81 | 50 | 131 |

That is, non-tuberculous intra-nasal abnormality occurred in 344 out of 500 consumptives, or in 68 per cent., as against 167 times in 452 healthy persons, or in

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36 per cent., being thus nearly twice as frequent in the former class.

Further, the 500 consumptives and the 452 controls being divided according to sex, the same nasal defect was present in 242 out of 359 male consumptives (67 per cent.), as against 116 times in 321 male controls (36 per cent.); and in 102 out of 141 female consumptives (72 per cent.) as against 50 times in 131 female controls (38 per cent.). Thus there was probably a small sex difference, the nasal defect being a trifle more frequent in the women, both consumptive and non-tuberculous, than in the men. In either sex, however, it preponderates markedly among the consumptives.

One adverse criticism upon all such comparisons as these, which are based on clinical examination (for the matter of that, laboratory work is anything but free from the same pitfall) is that of subconscious mental bias in favour of a certain positive finding, leading the investigator to put down an appearance as normal in one instance and as pathological in another, as suits his preconceived idea. It will be useful therefore to add here the results of comparison in respect of purely objective and unmanageable criteria. Let us take first perforation of the nasal septum. This lesion is wholly definite: either it is possible to bring the end of a bent probe, introduced into one nostril, out by the other one, or else it is not possible. There is no chance of equivocation here. Amongst the 500 consumptives there were four with non-tuberculous perforation of the nasal septum; one from syphilis (typical thick-edged crusted perforation in an ex-soldier who gave a history of having contracted syphilis in India, who bore the mark of a healed gumma in the thigh, and whose wife had no children but had suffered from several miscarriages); one from the results of a submucous resection done elsewhere a year or two previously; and two from dry rhinitis (the thin-edged, smooth, anteriorly placed, characteristic 'idiopathic,' 'traumatic,' end-stage of 'perforating ulcer').

Four cases in a total of 500 is 0·8 per cent. In the 452 controls there occurred only one case (from dry rhinitis) or 0·2 per cent. So that the obvious, gross lesion of a hole in the nasal partition, not due to tuberculous disease, was four times as common in the consumptives as in the healthy subjects.

In corroboration, Hajek may be re-quoted. He said that of 33 bodies in which the perforation due to dry rhinitis was found, only two had not pulmonary tuberculosis. Moritz Schmidt's text-book cites (S. 303) Weichselbaum as having found the same idiopathic septal perforation more than twice as frequently in tuberculous bodies as in others. Indeed the heading under which this quotation is included is that of nasal tuberculosis. But rhinological opinion is quite against the traumatic septal ulcer being itself tuberculous. The explanation of its frequency in tuberculous subjects may no doubt be found in its antecedent dry rhinitis, which, as is here shown, is present to a noticeable extent in these persons. Moreover, if we leave out of count altogether this variety of septal perforation, there remain 2 cases (one syphilitic, the other artificial) of perforated septum in 500 consumptives as against none in 452 controls. Again, Harke's (*loc. cit.*) material, already laid under contribution in Chapter I, yields this further result to analysis, that of his 104 cases already mentioned, of whom 42 were tuberculous and 62 non-tuberculous, the former showed 14 per cent. with non-tuberculous septal perforation, as against 3 per cent. in the latter. These high proportions, one may note, are probably due to so many of Harke's autopsies being made on syphilitics—a point we shall come to again. Moreover, one of his two cases amongst the 62 non-tuberculous was of the kind associated with dry rhinitis, and occurred in a woman who died of pleurisy, and who might therefore be suspected* of pulmonary tuberculosis.

* All the more, conceivably, from the immediate cause of death being pulmonary thrombosis. I have seen almost exactly the same sequence (pleuro-

Other protocols mostly fail when searched for mention of septal perforation. Freudenthal, however, who examined in all 232 sanatorium patients, records one septal perforation. It is expressly mentioned that it was non-syphilitic, and nothing is said of tubercle; indeed, a case early enough to be suitable for sanatorium treatment is hardly likely to have had a grave complication like nasal tuberculosis. This case of Freudenthal's, like all mine, occurred in a male subject.

A second plain enough test is evidence of old injury to the nose (a history of which is of course common in deflected septum) in the unmistakable shape of actual loss of external tissue—seen, for example, in the photograph opposite p. 95.

There were three instances of this kind in the consumptive material, but none amongst the controls.

Further oppositions between these two classes, almost as distinct as the foregoing, will emerge in the course of our argument; that is, in detailed consideration of the clinical material under the four headings already mentioned :—

- A. Cases characterized by nasal obstruction or mouth-breathing.
- B. Cases showing bilateral intra-nasal atrophy.
- C. Other rhino-pathological cases.
- D. Cases with normal nasal condition.

pneumonia ending in pulmonary thrombosis and *exitus lethalis*) happen in a woman who had been nursing her husband, very ill of consumption, and who might well have been infected by him.

CHAPTER IV

CONSUMPTION, NASAL OBSTRUCTION, AND MOUTH-BREATHING

BEFORE one treats of the above connexions, between consumption and nasal obstruction, and between consumption and a condition of mouth-breathing from causes other than existing nasal obstruction, it will be well to clear the ground of discussion of what otherwise might possibly be advanced as a fallacy. Not that the objection would be tenable, as will be seen immediately; but nevertheless the work we are going to notice is so germane to our subject that it cannot be left unmentioned.

In the case of youngish patients with early right-sided apical phthisis, good general condition, and nasal obstruction, it must be remembered that Krönig (83), and after him others, have described a symptomatically and indeed clinically similar syndrome, in which the pulmonary condition is claimed to be non-tuberculous and the direct result of the nasal one. The pathogeny imputed is that mouth-breathing carries atmospheric dust through the wide, straight right bronchus* into the numerous † bronchioles of the right apex. The deficient expulsive

83. Krönig: *Die deutsche Klinik*, 1907, Bd. XI, 22 Vorlesung, S. 634.
Medizinische Klinik, 6 October 1907.

* We might add the example of foreign bodies reaching the lung by the air-passages. They are more frequent in the right lung for the same anatomical reason.

† Radiographs are given in the former of the above papers to show that after post-mortem injection, at any rate, there are considerably more bronchioles in evidence at the right than at the left pulmonary apex.

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capability of the pulmonary apex allows the dust to remain in the bronchioles, and local bronchitis, pulmonary apical collapse, and local simple fibrosis ensue in succession. Hence symptoms and physical signs of a non-tuberculous apical fibrosis, which may be mistaken for early pulmonary phthisis.

No confusion, of course, can result when tubercle bacilli are found in the spit, as they were in all the 500 consumptives of our present inquiry. But in face of negative sputum, dextro-lateral apical signs, and nasal obstruction, Krönig's claim might lie. The chief points of distinction from pulmonary tubercle are stated to be the absence of impairment of tidal percussion at the base of either lung, showing maintenance of free basal excursion in inspiration (i.e. that this alleged non-tuberculous apical affection is not accompanied, as apical tuberculosis very often is, by basal pleural adhesions); secondly, absence of tuberculous family history, and of toxic symptoms like pyrexia and loss of weight; thirdly, quick amelioration once the nasal obstruction is remedied.* We might add a fourth, namely the presence of adenoids, for it is claimed that these vegetations are the commonest cause of the nasal obstruction that 'collapse-induration' patients suffer from, whereas, as we shall see, they are a relatively rare immediate cause of nasal obstruction in consumptives.

Now, with regard to this syndrome of Krönig's—accepted by writers of the standing of Wolff-Eisner and Bandelier and Roepke—one ventures to opine that it probably does occur, and does get confused with phthisis, but according to the present writer's experience with greatly less frequency than has been sometimes stated (Blümel (84), 1·6 per cent.

* Ziem (*Monatsschrift f. Ohrenheilkunde*, 1879, cited in E. Bloch's *Mundatmung*, S. 37) tells of a case that, although the nasal condition mentioned hinders expiration more than inspiration, may easily have been such as Krönig describes. A patient was sent to Görbersdorf Sanatorium as consumptive. Voltolini found much enlarged posterior ends of the inferior turbinates. After destruction of these with the galvano-cautery (the modern treatment is, of course, snaring), the patient was freed from his chest trouble.

84. Blümel: *Münchener medizinische Wochenschrift*, 28 July 1908.

of the patients at Görbersdorf Sanatorium ; Krönig, seven cases a year at a general hospital). But Blümel, as also Schönemann (85), included nasal sinusitis among the causes of nasal obstruction in such patients. This is going outside Krönig's rubric, which had to do with dust, not with pus, inhalation. There are certainly pulmonary results from pus inhalation which mimic phthisis—discussed in Chapter VII—but they are manifested in either lung and show other differences from 'collapse-induration.' However, a possible fallacy greater than this is manifestly confusion with early quiescent right-sided consumption. One must speak with respect of the author of the very valuable article on early diagnosis of phthisis in the review of German clinical medicine at the outset of the twentieth century, but one may note all the same that Krönig and his followers leave unmentioned and unexcluded such an obvious source of error for them as our present subject—the known association, whatever its explanation, of nasal obstruction with indubitable pulmonary tuberculosis. The absence of text-book reference already alluded to is perhaps responsible for their omission.

Some, then, of these cases reported as apical collapse-induration were probably actual apical tubercle in which sputum was either absent or free from the bacillus of Koch. One communicated (86) in an article entitled "Fausses affections pulmonaires d'origine bucco-naso-pharyngienne" may be cited as an example. This was of double nasal obstruction with asthmatic attacks, and with pulmonary signs at the right apex consisting in dulness, diminished breath sounds, and increased vocal resonance, while over the apex of the right lowest lobe were heard râles. Resection of the nasal septum relieved the asthma, but two months later the state of the lung was unchanged. Now the 'lower apex' being affected is suspicious, for this is a very common spot for tubercle, but being intra-thoracic

85. Schönemann : *Revue Suisse de Médecine*, August 1909.

86. Aboulker : *Annales des Maladies de l'Oreille, du Nez, et du Pharynx*, February 1910, p. 163.

is not specially liable to dust-retention. Again, we have seen that one of Krönig's (perhaps more particularly Blümel's) diagnostic rules is that the pulmonary condition clears up when the nose is treated, whereas in Aboulker's case above it did not. Strict application of this rule should upset many 'collapse-induration' diagnoses, for the present writer has often enough relieved nasal obstruction in sanatorium patients with negative sputum, but has never seen any consequent sudden disappearance of pulmonary physical signs such as Blümel describes. And in spite of a naturally keen look out for cases of 'collapse-induration,' the one given below is the only altogether likely one met with in his experience.

A clerk, aged 23 years, came complaining of pains in the head and cough. He had always been liable to 'colds'; a brother abroad was said to be consumptive. There was some sputum, occasionally bloodstreaked, pain in the right side of the chest, slight loss of weight, and shortness of breath. The general condition remained, however, good; no pallor, vigorous build, pulse 80 per minute, respirations 17, evening temperature 99°. The sputum was negative. Physical examination showed Krönig's apical isthmus of resonance much narrowed on the right side, which was also noticeably flattened above: at the bases tidal percussion was impaired on both sides. He was a mouth-breather, and spoke nasally; had had matutinal epistaxis and nasal obstruction for some years. The inferior turbinates were a little enlarged, and there were moderate sized adenoids (in a small nase-pharynx) visible on posterior rhinoscopy. Anterior turbinectomy done May 31st, and removal of adenoids June 2nd. On June 14th the patient said he felt much better, since he could 'breathe now.' By September 8th sputum had disappeared, and the apical band of resonance was of normal dimensions on both sides. Same condition two years later, when he was at work and keeping well.

Even this case, it will be noticed, fails in two particulars to conform to Krönig's postulates. There *were* basal adhesions, and a family history of consumption (the brother had been ordered to go to South Africa for his chest) was given. But the professor in a later communication seems to have relaxed his rules, has described finding in some families one member with apical collapse-induration, and another with apical tuberculous infiltration. This seems a significant admission. And certainly some

of the cases reported as collapse-induration were quite as atypical as the one given above. Thus Lapham's (87) two patients had toxic symptoms, viz. bad general condition with pyrexia and loss of weight.

On the whole it seems probable that apical collapse-induration is a pre-tuberculous state. This is the reasonable sounding view taken by Rosenberg (88) and by Bloch (89). Chronic mouth-breathing (in a mouth-breather one not seldom sees dust from the atmosphere lying on the vocal cords) may lead to deposition and retention of dust in that respiratory dead point, the pulmonary apex; especially the right apex, by reason of anatomical peculiarities already mentioned. The consequent bronchitis of the finer apical bronchi may easily render the affected apex a *locus minoris resistentiae* to tubercle. The word 'pre-tuberculous' has an ill sound, because factors formerly reckoned pre-tuberculous (bronchitis for example) were, as Rivière conveniently puts it, often, if not always, sub-tuberculous. But apical collapse-induration would very likely constitute a real pre-tuberculous state.

It might, too, be more frequently met with from the rhinological side. Rosenberg, taking 50 cases of nasal obstruction from a nose and throat clinic, describes the affection under notice in eighteen of them. However, here too we take leave to conclude that a good proportion of these eighteen had in all probability quiescent or obsolete apical tuberculosis of the right lung, for pulmonary tubercle as well as apical collapse-induration prefers that side, a finding recently confirmed, by the way, through autopsies on soldiers killed in the European War.

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87. Lapham: *Medical Record*, New York, 3 August 1912.

88. Rosenberg: *Deutsche medizinische Wochenschrift*, 31 August 1911. *Archiv f. Laryngologie*, 1911, Bd. XXV, H. 1.

89. Bloch: *Wiener medicinische Wochenschrift*, February 1913, Nos. 8 and 9.

The ground thus cleared, we approach the subject of nasal obstruction in its connexion with phthisis proper, and first in respect of

(a) FREQUENCY, which may readily be shown in tabular form.

| | | | With Nasal Obstruction or Mouth-breathing. | | |
|----------------------|-----|---|-----------------------------------------------|----------------|---|
| Consumptives— | | | | | |
| Men .. | 359 | | 160 | (44 per cent.) | |
| Women .. | 141 | | 46 | (32 , ,) | |
| — | — | — | — | — | — |
| Total .. | 500 | | 206 | (41 , ,) | |
| Control— | | | | | |
| Men .. | 321 | | 81 | (25 , ,) | |
| Women .. | 131 | | 17 | (12 , ,) | |
| — | — | — | — | — | — |
| Total .. | 452 | | 98 | (21 , ,) | |

So that nasal obstruction and mouth-breathing were almost twice as common in the consumptives as in the non-tuberculous: rather less than twice as common in the males, and a good deal more than twice as common in females. Moreover, the men, whether consumptive or not, suffered more often from nasal obstruction than the women did.

This sexual difference has not been noted by other writers, so that it becomes important to search their records for presence or absence of corroboration. The estimates thus obtained are of course not always exactly those the writers themselves might have made, for some have not regularly noted existence or non-existence of nasal obstruction. But where the morbid rhinological appearances recorded must necessarily have entailed obstruction, one has assumed its existence. Moreover, since male and female cases are treated alike in this respect, the inferences drawn, being not absolute, but only relative and comparative as between the sexes, are unaffected in value.

Those who have left protocols adequate to the purpose are Liaras, Freudenthal (last 122 cases), Alexander, Moeller

and Rappoport, Ducos; and their figures work out as follows:—

| Author. | | Male Consumptives. | With Nasal Obstruction. | Female Consumptives. | With Nasal Obstruction. |
|------------------|--|-----------------------|----------------------------|-------------------------|----------------------------|
| Liaras | | 63 | 15 | 12 | 1 |
| Freudenthal.. .. | | 84 | 17 | 38 | 7 |
| Alexander | | 48 | 33 | 41 | 11 |
| Moeller | | 72 | 32 | 48 | 10 |
| Ducos | | 43* | 12 | 14* | 4 |

Also in Ducos' control of non-tuberculous persons there were 24 men, of whom 4 had nasal obstruction; and 26 women, of whom similarly 3.

Very clearly, then, the observation of nasal obstruction being commoner in male examinees than in female ones, whether the said examinees are tuberculous or not, is on the whole fully confirmed.

Two causes might be advanced for this phenomenon. Firstly, the male sex is the more exposed to trauma, and injury to the nose is given in Zuckerkandl's well-known work (90) as a cause of septal deformity, which condition, of course, often produces nasal obstruction. As will be seen presently, a history of injury to the nose was given three or four times as frequently (12 cases out of a total of 160, as against 1 out of 46) by the male consumptives treated of in this section, as by the female ones; and also much more often (3 cases out of a total of 81, as against none out of 17) by the male, as by the female, controls. Exposure to trauma, then, seems likely to be one reason for the male preference shown by nasal obstruction, while secondly there is the question of the different facial or nasal conformation of the two sexes.

The authors who have examined scientifically facial type in relation to nasal disease are Siebenmann and his

* These are the total of cases of which details are given: in Ducos' summary five more are included.

90. Zuckerkandl: *Anatomie normale et pathologique des Fosses nasales et de leurs annexes pneumatiques*, French translation, Paris, 1895, chap. iii.



SEVERE TRAUMA TO NOSE LONG PRECEDING CONSUMPTION
(p. 87).



CHAMÆPROSOPIA.



MESOPROSOPIA.



LEPTOPROSOPIA.

To face p. 95.

school (91). Basing himself upon anthropometry and following in particular Kollman, Siebenmann expresses both overbreadth and narrowness of the face as a function of the two measurements *upper facial height* and *maximum interzygomatic distance*.* Overbreadth is called *chamæprosopia*; narrowness, *leptoprosopia*; the mean between these two extremes, *mesoprosopia*. Photographs of three of our consumptives are given to illustrate these facial types.

The broad type of face (*chamæprosopia*) is stated by Siebenmann's school to occur more often in women than in men; and nasal obstruction is stated to occur more often with a narrow type of face, as is indeed likely, for the same authors with one or two others agree that in general a narrow type of face (*leptoprosopia*) entails narrow nasal passages (*leptorrhinia*). It is a simple deduction from the above, then, that women, as compared with men, should be relatively free from nasal obstruction.

As regards the bearing of this teaching upon our present material, the writer has, with the instrument recommended in the anthropometrical report just cited, measured 295 of the 500 consumptives, i.e. 213 men and 82 women. Of the men, 111, or more than half, were leptoprosopic; but of the 82 women only 27, or just under a third. It would seem therefore that the preference for the male sex shown by nasal obstruction may have something to do with the known preference of the same condition for leptoprosopic subjects.

Quite in harmony with this last proposition is Schöne-mann's finding (*loc. cit.*) that leptorrhinia was commoner by 25 per cent. in his consumptive † than in his non-

91. Siebenmann: *Münchener medizinische Wochenschrift*, 7 September 1897. Meisser: *Archiv f. Laryngologie*, 1898, Bd. VIII. Minder: *Idem*, 1901, Bd. XII. Schönemann: *loc. cit.*

* For particulars of these two measurements see Siebenmann (*loc. cit.*), as also *Report of British Association Committee for Anthropometric Investigation*, London, 1909, p. 9 (measurements 1 and 3).

† If leptorrhinia, i.e. a narrow nose, is more frequent in consumptive than in healthy persons, then obviously in consumptives a smaller degree of septal deformity, of turbinal enlargement, and so forth, will be productive of nasal obstruction than in the case of the non-tuberculous.

tuberculous subjects: for we have already seen much, and shall see more, evidence that nasal obstruction is likewise a characteristic of consumptives. We recall in particular Talbot's remark (*loc. cit.*) as to the tuberculous tendency of "persons with long thin noses and arrested nasal cavities." Quite in harmony, too (to anticipate a little), are certain results we reach in the next chapter when examining the sex incidence of bilateral nasal atrophy, a condition which is roughly the converse of nasal obstruction.

The second reason, then, for the male incidence of nasal obstruction, in consumptives and controls alike, may be the natural male incidence of leptoprosopia. But, whatever its causes, the phenomenon itself has important practical bearings, with which we deal later.

(b) The CAUSES of the nasal obstruction and of the mouth-breathing are tabled below. Sometimes, of course, two or more causes coincided in the same subject, so that the figures, which stand for percentage frequencies in the whole material, must not be taken as mutually exclusive.

| LESION. | MEN. | | WOMEN. | |
|------------------------------------|-------------|----------|-------------|----------|
| | Phthisical. | Control. | Phthisical. | Control. |
| Deviated septum | 23 | 15 | 12 | 3 |
| Dislocated septal cartilage .. | 11 | 4 | 4 | 1·5 |
| Septal spurs and ridges .. | 7 | 3 | 5 | 3 |
| Enlarged inferior turbinals .. | 6 | 2 | 4·9 | 0·7 |
| Projection of superior incisors .. | 3·5 | 2 | 9 | 0·7 |
| Chronic rhinitis | 3 | 1 | 0·1 | 0·1 |
| Adenoids | 2·5 | 2 | 6 | 3 |
| Polypi | 0·8 | 0·6 | None | 0·7 |
| Sinusitis | 0·8 | 0·9 | None | None |
| Collapsed nostrils | 0·2 | None | 0·7 | None |

The general feature of marked predominance of nasal obstruction in consumptives is seen to be reflected

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severally * in all of its causes save two or three, noticeable among which are *polypi* and *adenoids*. Noticeable, because these are in themselves and generally speaking two of the commonest causes of nasal obstruction that exist. The probable reasons for their rarity in the special class of consumptives are that polypi quickly obstruct, and so cause great discomfort and therefore soon encounter the surgeon's snare. Whatever the reason, there is no doubt that polypi are a quite unusual source of nasal obstruction in consumptives proper. The 'history of previous rhinological treatment' mentioned in the next table never included treatment for nasal polypi. The similarly unusual infrequency of adenoids is explicable by the age of the subjects, which, corresponding to the usual age-incidence of consumption, was in every instance except one or two over sixteen years. But many had undoubtedly suffered from adenoids in their childhood.

Coming to the other causes, *deformity of one kind or another of the nasal septum* obviously takes the first place. In the cases of septal deviation the septum not seldom met with its convexity the inferior turbinate or even the wall of the nasal fossa. Then comes *enlargement of the turbinate bodies*. These conditions, in contradistinction to nasal polypi, produce nasal obstruction of a long continued kind, beginning soon after puberty, and thus only a very few years before the usual age of onset of consumption. *Dislocated septal cartilage* is given separate mention for three reasons. Firstly, because of its high relative frequency in the consumptive group; next because of the ease with which it can be observed, especially as the patient lies in bed. Any one who walks through two or three wards of a consumption hospital may readily notice the frequency with which the fore end of the septum is displaced into the lumen of one or other nostril, and thus without any rhinological apparatus

* So are also the general features of its greater predominance in men, whether consumptive or not, than in women; and of the greater disparity in respect of it between consumptive and non-tuberculous women than between consumptive and non-tuberculous men.

put our contention to a summary test. Lastly, dislocated septal cartilage has nothing directly to do with mucosal engorgement, but is manifestly a derangement of the nasal 'charpente,' of the framework itself of the nose.

Some of the cases of nasal obstruction from septal deformity (generally septal deviation) were unilateral in character, and complicated by varying degrees of atrophy of the mucosa upon the opposite side, or, short of atrophy, of a dry condition, both caused, seemingly, by excessive roominess of the patent nasal fossa, as also by its having to do, as it were, double duty. Not uncommonly, however, there was a smaller amount of dryness and crusting on the obstructed side, even (as is mentioned near below) atrophy itself. In such cases we have probably the end stage of long-continued hypertrophic rhinitis. There is a class of case, not common perhaps, but still well known at laryngological clinics, called unilateral ozæna. Here some lesion, nearly always deviated septum, occludes or partially occludes one nasal passage and at the same time enlarges the other. This enlargement, together with the over-functioning aforementioned, contributes to the origin of an ozænatous condition which is soon cured when the septum is straightened. There were no instances* of unilateral ozæna observed in our material, but nasal obstruction plus unilateral atrophy (where on the patent side the posterior naso-pharyngeal wall could be seen an anterior rhinoscopy) occurred in 34 of the male consumptives in this section, as against 2 of the male control; and similarly in 17 as against 3, in the case of the females. Such unilateral atrophy probably corresponds to nasal changes short of actual unilateral ozæna. It must be this kind of case that Moure briefly alludes to when he speaks of his 'coryza pseudo-atrophique' sometimes being made more evident by a deviated septum. Occasionally the obstruction was on the same side as the atrophy, which, for instance, might be visible below a large septal spur. In such a case it is possible

* In Case 144 (see Protocol at end of book), however, only fætor was lacking.



CONSUMPTIVE WITH DISLOCATED SEPTAL CARTILAGE AND
PROJECTION OF THE SUPERIOR INCISOR TEETH.



PULMONARY PHthisis
PLUS SQUINT.



TUBERCULOUS CERVICAL GLANDS
PLUS SQUINT.



TUBERCULOUS KNEE
PLUS SQUINT.

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that the atrophy is caused by the inspiratory air current, blocked from its proper path by the spur, taking an abnormal direction.

A characteristic appearance in cases of septal deviation, which no doubt occurs in all, whether consumptives or others, but which I do not remember seeing mentioned in text-books, is that when the septum is deviated, say to the right, then on posterior rhinoscopy the muco-periosteum of its posterior part is seen to be thickened on the right side too. For this reason the posterior edge of the nasal septum of consumptives is, taken generally, thicker than that of non-tuberculous persons.

Projecting superior incisor teeth is a condition that can give rise to mouth-breathing, or perhaps rather keep it up, in the absence of nasal obstruction. Hence, mainly, the words "and mouth-breathing" in the title of this chapter. But, of course, projecting incisors are themselves nearly always the mark of nasal obstruction in the past, in the childhood of the subject in whom they are found, being known as part of the characteristic facies.

Their preponderance in consumptives, like that of dislocated septal cartilage, is evidence of a difference in respect of the nasal framework itself, not merely of the nasal mucous membrane; a difference therefore which can hardly be tuberculo-toxic in origin.

Sinusitis (since there are more cases of it to come) is discussed separately in Chapter VI.

A second table gives some of the more definite points in
(c) The ANAMNESIS. Generally one may say that nasal symptoms in a consumptive are very liable to be overlooked by both physician and patient because of their close connexion with the respiratory tract and consequent resemblance to pulmonary symptoms. A history of mouth-breathing or nasal obstruction, although much more frequent in the consumptives than in the controls, is thus not enumerated because it is open to the charge of some want of precision. As to priority of nasal or pulmonary

symptoms, there were 64 male and 28 female consumptives who were quite clear on this point. Fifty of the men and 26 of the women had noticed nasal symptoms first, as against 14 and 2 who gave the converse history. Coming to particular points, the figures below represent, as in the last table, percentage frequencies on the whole material.

| HISTORY. | MEN. | | WOMEN. | |
|---------------------------------------------|-------------|----------|-------------|----------|
| | Phthisical. | Control. | Phthisical. | Control. |
| Of epistaxis | 4 | 1 | 3 | 2 |
| Of previous rhinological treatment | 2·7 | 1 | 1 | 0·7 |
| Of trauma to nose | 3 | 0·9 | 0·7 | None |
| Of getting crusts from the nose | 3 | 0·9 | 0·7 | None |
| Of hay fever | 0·5 | None | 0·7 | None |

Thus the results of subjective examination tally with the objective findings. All the above particulars are such as might be expected in nasal obstruction, if it be remembered that the patients giving a history of *epistaxis* and of *nasal crusting* were mainly those suffering from the unilateral atrophy above mentioned, and in whom there was a dry or an atrophic condition of the mucosa of the patent nasal fossa. The other details, of having had *rhinological treatment*, of having suffered from *injury to the nose*, or from *hay fever*, are common enough accompaniments of nasal obstruction. With regard to the last, it is interesting to find a confirmation in an observation of de Laval's (*loc. cit.*), who said that in Canada tuberculous subjects were much affected, towards the autumn, by the pollen of *Hydrastis Canadensis*.

(d) COMPLICATIONS. Nasal obstruction and mouth-breathing are known to cause, at least to be often complicated by, more or less remote bodily derangements. An unfavourable influence is exerted upon deeper-lying parts of the upper respiratory passages, conduced to certain forms

of pharyngitis and laryngitis, to post-nasal catarrh, and even to middle ear disease. Also external deformity of the nose, thoracic deformities, palatal distortions and dental irregularities are commonly to be found in association. In pursuit of the study of our subject we must see, therefore, if this general feature of nasal obstruction obtains also with the nasal obstruction of consumptives.

We will begin with clearly defined forms of *simple chronic laryngitis*, excluding a mere reddening of the vocal cords, and reckoning only cases showing paresis of the internal tensors of the cords, where a spindle-shaped gap occurs between them on phonation; cases showing the lesions of pachydermia (slight thickening of the posterior laryngeal wall or a flat grooved inter-arytenoid tumour; enlargement of one vocal process with complementary hollowing out of the opposite one); and cases showing singers' nodes. Such simple chronic laryngitis was found more frequently in phthisis plus nasal obstruction than in other phthisis. It is, as is known, far from uncommon in consumptives generally, a fact which has been put down to the laryngeal strain involved in cough and in other expulsive efforts, such as scraping the throat to raise pulmonary sputum out of the larynx. But on the other hand, one or two of the writers cited in Chapter II have argued that, seeing its association with nasal defect, it should be ascribed to the frequent nasal insufficiency of consumptives.

The following table goes to show that both views are correct, or rather, that both factors are concerned.

PERCENTAGE FREQUENCY OF SIMPLE CHRONIC LARYNGITIS
IN CONSUMPTIVES.

| | | Male. | Female. |
|----------------------------------------------|--|-------|---------|
| With nasal obstruction or mouth-breathing .. | | 11 | 8 |
| With other rhino-pathological conditions .. | | 8 | 7 |
| With normal nasal condition | | 6 | 7 |

So that although nasally abnormal cases of phthisis—especially those with nasal obstruction or mouth-breathing—suffered rather more with simple chronic laryngitis than the remainder, yet these latter too, whose nasal condition was normal, were anything but free.

Post-nasal catarrh was common in these obstructive cases, commoner too in consumptives generally than in the control, while the same may be said of non-tuberculous middle ear disease. Twice nurses at tuberculosis institutions have remarked to the writer how often consumptives were deaf, and he has found the same thing. Moeller and Rappoport noted a considerable proportion of deafness and of otitis media in their patients. Trudeau's successor, Lawrason Brown (92), mentions painless aural discharge as among the common complications of consumption.

Coming to the other class of complication mentioned, namely that characterized by bony deformity, it happens that we have already found one of them, that is superior dental protrusion, distinctly in excess in the phthisical with nasal obstruction. In corroboration Talbot (*loc. cit.*) may be referred to again. Galton and Mahomed, in their already cited paper, came near to finding the same result. As a fact, several of the photographs they reproduce are of mouth-breathers with projecting teeth. They stated further (*loc. cit. p. 488*)—

The components of Fig. 30 are chiefly characterized by the large ears, narrow open mouths with prominent upper teeth and short jaws, short upper lip . . .

which is just the facies of nasal obstruction. That this facies did not impress itself more strongly in their final results (and so lead them to give it mention in their final conclusion, instead of merely as a by-result) is probably due to their preoccupation with composite photography, a method of uncertain outcome which was central to their whole inquiry.

To go into the subjects of *thoracic deformity* (in which,

however, we have seen a positive result claimed by Besançon, who found types of phthisical thorax identical with the malformed ones associated with nasal obstruction), of *palatal* distortions, and of *dental irregularities* would take us here too deeply into detail, too far afield; while in the case of the last-named abnormality the writer lacks the necessary special knowledge. Something might be said, however, as to the *external nasal deformity* fairly often seen with septal deflection. And in place of giving more percentages regarding details, we might, for corroboration, approach a source not usually resorted to in medical works, and naturally so; although it is also one which the school of Freud has shown medical investigators cannot afford to neglect. When one reflects that pulmonary phthisis is the commonest of serious diseases which affect the Caucasian race, and that it is also one of the most lingering, exciting for long periods general attention and sympathy—easy of recognition too, encountered and known by every one, medical or lay—it seems not at all unlikely that if its physiognomy is indeed to some extent characterized as has been maintained above, then this fact should have been reflected somewhere in the mirror of life which is given us in great literature.

If further one looks up the consumptives portrayed in the *Human Comedy* of Balzac, whose Shakespearean knowledge of humanity makes him worth appealing to, it will be noticed, to begin with, that in hardly any of them does the disease come, so to speak, as a surprise: in almost all it is led up to by some antecedent, or is found coincident with some trait, usual in medical experience. In this matter, at any rate, as so rarely happens in fiction, the medical details are true to life. Thus Pierrette (in the story of the same name) was an overworked, badly used domestic servant with chlorosis; Louise de Chaulieu (in *Les deux jeunes Mariées*) is described as very thin and slight, with a long neck; Bettina Mignon (in *Modeste Mignon*) had a love disappointment; Comtesse d'Hérouville, a very unhappy married life. Now, in *La Recherche de l'Absolu* we

are told of the facial appearance of Madame Claës (nearly the sole remaining consumptive on the list) :—

Le trait qui donnait le plus de distinction à cette figure mâle était un nez courbé comme le bec d'un aigle, et qui, trop bombé vers le milieu, semblait intérieurement mal conformé.

Somewhat of this formation was the nose of the musician Chopin, whose open mouth and thin, leptoprosopic-looking face make it very probable that he had nasal obstruction as well as the pulmonary phthisis which ended his life so soon. But this subject, the nasal physiognomy of distinguished consumptives, though interesting, is too uncertain to repay study until firmer evidence has been thoroughly examined.

(e) TREATMENT.

The treatment of nasal obstruction in phthisis may be divided into operative and non-operative. Not much justification is needed for *non-operative* measures. Habitual mouth-breathing is an abnormal practice, making a regular airway of what is primarily a food-passage, and leading, as has been said, to ill effects in the lower respiratory tract and elsewhere. The case for remedying it, always strong, should *a priori* therefore be still stronger in the presence of actual pulmonary disease. Slight obstruction will often disappear spontaneously in the pure air of the sanatorium, and possibly some of the good effects of the hygienic-dietetic treatment should be ascribed to this fact. However, as regards the great majority of patients the return to less favourable atmospheres must be provided against. In dispensary practice, and at the sanatorium in the more marked cases, a convenient routine is to give out borax and bicarbonate of soda with the following plain direction :—

Dissolve a *very small* teaspoonful of each powder in a pint of warm water, and add a large teaspoonful of clean white castor sugar. Sniff some of this solution from the hand four or five times through each nostril, spitting it out into a bowl held on the lap. Do this once or twice every day.

These instructions patients readily follow, and with good result. More astringent collunaria (Coll. Hazeline, etc.) can be prescribed as required.

One or two conditions must be laid down respecting *operative treatment*. If we regard nasal obstruction as having conducted to the development of the pulmonary tubercle, then it might be objected that to remedy the former affection when the latter and more serious one has already supervened is like locking the stable-door after the thief's visit. But there are to be considered, as aforementioned, the patient's after-life and the question of his continued exposure to fresh infection from improper breathing, so that a preferable figure by which to illustrate nasal treatment of consumptives would be the caulking of a leaky vessel. If the boat represents the patient; the leak his open mouth; the water the boat makes, the tuberculous invasion of his lungs; the sea, his active life and avocation; and the shore the sanatorium—then it is plainly vain to haul the sinking boat up on the beach and merely bale it out. Before re-launching one should stop the leak.* Of course, this simile is not insisted on literally. One can see cases of arrested consumption going about breathing through their mouths as they have always done. However, if Tröltsch's already cited remark be correct, that, other things being equal, the tuberculous person whose nasal catarrh has been properly treated will live longest, their chances of recovery have not been improved by the neglect. Again, the caulking process may not be admissible when it involves operative measures, for in active pulmonary tubercle such may be harmful, and in incurable or very advanced, not worth while. Chapman Jarvis, writing in pre-sanatorium days, thought earliness of the lung disease an essential. He also warned

* Wegmann (*Archiv f. Hygiene*, Bd. XXI), in an article entitled "Der Staub in den Gewerben mit besonderer Berücksichtigung seiner Formen und der mechanischen Wirkung auf den Arbeiter," says that in animals, if dust inhalation be left off, the lung eliminates to a great extent the existing lesions and recovers. This may be of importance, considered in connexion with the evidence of a pulmonary pre-tuberculous condition caused by nasal obstruction.

against operation if the nasal mucosa showed marked pallor, a condition seldom seen nowadays. The laryngologists of the Henry Phipps Institute of Philadelphia, whose work is largely among out-patients, very reasonably stipulate (*loc. cit.*) for incipient lung tubercle too. Blumenfeld, in the text-book cited, had seen no harm follow operative procedures (except with the galvano-cautery) in consumptives' noses, although he had not done septal resections.

The provisos the present writer would be inclined to make are the following. If the tuberculosis is beyond the Turban-Gerhardt Stadium I, quiescence of the pulmonary lesion is a pre-requisite to nasal operation, and quiescence judged by the patients' temperature considered according to strict sanatorium standards. Thus, however taken, the before-breakfast temperature should regularly not exceed 98° F.; and that at 6 p.m., if oral, should not exceed 98·4°, if rectal after resting, should not be over 99°, if rectal after moderate exercise (walking), not over 100·4°.* Also, in women, nothing should be done during menstruation, because of the slight pyrexia then and the nasal turgescence. Tuberculous laryngitis is of itself no contraindication, and perhaps re-establishment of the nasal function is especially advantageous here, notwithstanding that, as will be seen later, nasal defect does not predispose to laryngeal more than to pulmonary tubercle.

Following these rules, this writer has never had the slightest bad result in eight years' experience, during which he did about 100 submucous resections on consumptives, also anterior turbinectomy, removal of adenoids, spurs, polypi, and the enlarged 'posterior ends' of the inferior turbinates. The galvano-cautery was used, say, half a dozen times.† Local anaesthesia was of course em-

* It would be higher, of course, if taken immediately after 'graduated labour,' but only quiescent cases are fit for this. 100·4° F. is the mark which must not be exceeded for an after-exercise temperature in the Nordrach routine: if the patient gets a higher one, he is given a shorter or less arduous walk the next day.

† In two of Alexander's 89 cases there is a note of nasal galvano-cauterization having been previously done, evidently with no bad results.

ployed, except in one or two instances for the removal of adenoids. Prolonged general anaesthesia, which is ordinarily quite needless, might possibly light up the lung condition. A case of this has been privately reported to me, and in one of sinusitis mentioned in Chapter VI, the general anaesthetic possibly did harm. Also conceivably local tuberculosis might develop, as Blumenfeld described with the cautery, at the site of incision, but hardly in face of the precautions already mentioned. An instance (93) in which intra-nasal lupus followed anterior turbinectomy performed on a subject of unsuspected phthisis cannot be considered one in point. As to remoter dangers, the writer knows of none, nor are any mentioned in the literature. But he has twice (once in his own experience, once in that of another) seen a consumptive picked for septal resection who for indifferent reasons was not operated on, and who died of tuberculous meningitis within about a fortnight. If, then, this complication should follow a properly performed nasal operation, one must remember that the fallacy of *post* and *propter* is perhaps nowhere more insidious than in phthisio-therapeutics.

About half-way through the period of sanatorium residence is the best time for nasal surgical interference, since by then the general health is recruited and the pulmonary disease benefited, and it is possible to have made a full diagnosis of the case in every aspect. Further, the patient has plenty of leisure and a healthy place to recover in, and can be supervised as regards re-education in nasal breathing, a matter that requires attention, especially when projecting upper teeth prevent easy closure of the lips. A jaw bandage and a mouth-obturator worn at night may be necessary; for the latter an old-fashioned mouth respirator, the perforations in it being blocked up with sealing-wax, is very useful in holding the lips together.

Nothing dramatic in the way of immediately beneficial result to the lung should be expected from the rectification

of nasal obstruction in consumptives. Twice it has been the writer's lot to introduce rhinological treatment into institutions for consumption. There was no sudden therapeutic advance witnessed either time. Occasionally cough is specially lessened, although the case that showed this best was of a young woman with septal deviation, who for years had been subject to sneezing. When she became consumptive the sneezing used to start her coughing. Two days after submucous resection she stopped sneezing, and therefore cough became less frequent.

As in most rhinological treatment of consumptives, it is to the future that one's aim is directed, when the patient, discharged from the sanatorium, has, under pressure of economic necessity, to cope with less satisfactory hygienic conditions, and particularly with much more of atmospheric impurity; to which end his natural respiratory filter, the nose, should be in good order.

CHAPTER V

CONSUMPTION AND BILATERAL INTRA-NASAL ATROPHY

(a) DIAGNOSIS.

What appearances should be reckoned as atrophy?

The turbinate processes or turbinal bodies—for practical purposes the inferior and middle ones—are of course the structures in which intra-nasal atrophy chiefly manifests itself, and it is upon the wasted or shrunken state of these that the diagnosis mainly rests. Two of the authors cited in Chapter II have attempted to classify their atrophic patients according to the amount of atrophy present. Payson Clark (*loc. cit.*) called ‘markedly atrophic’ those cases where there was only a trace of the turbinates visible, or in which the muco-periosteum over them was so shrunken that the outline of the bony framework could be clearly seen. He used the expression ‘moderately atrophic’ when the turbinates still retained some of their normal curved outline, but were evidently much smaller than normal. Atrophy short of this he did not count as such.

Alexander (*loc. cit.*) distinguished three grades. ‘Atrophy of a moderate degree’ was the term he used when some extent of the naso-pharyngeal wall could be seen on anterior rhinoscopy; ‘advanced atrophy’ in cases where, the middle turbinate being involved in addition to the inferior, the highest or sphenoidal turbinate body came into view; and ‘total atrophy’ when the turbinals were only indicated by small ridges.

Obviously these distinctions are far from being objective, and it has therefore seemed preferable to the writer not to

classify the *amount* of atrophy present. As a criterion of its presence has been taken the visibility from the nostril of the posterior wall of the naso-pharynx: only in two of the cases considered in this chapter did manifestly shrunken turbinals coincide with its non-visibility. It may be objected that not every rhinologist would agree that it is abnormal for this posterior wall to be seen from the front, as also that nervousness of the patient before examination may cause physiological shrinking of the nasal mucosa. But with a control of healthy persons these things are matterless, for the estimation of results is a comparative one. To be able to see the posterior naso-pharyngeal wall on looking into the nose with reflected light is constant in atrophic rhinitis, although to a much greater extent than in many of our present cases. It is a well-defined phenomenon, the only thing mistakable for it being adenoids, which can be excluded on posterior rhinoscopy. Besides, if one can see adenoids from the nostril, then in their absence the posterior naso-pharyngeal wall could be seen too, it lying close behind them: I have found two cases of this kind where, after the adenoids were removed, the posterior wall became visible. Finally, one might just say that a turbinal small and undeveloped because of pressure from a septal deformity has not been counted as atrophic.

(b) FREQUENCY.

| Consumptives— | | | With Bilateral Intra-nasal Atrophy. | | |
|---------------|-----|--|-------------------------------------|----------------|-------|
| Men .. | 359 | | 32 | (8 per cent.) | |
| Women .. | 141 | | 43 | (30 | , ,) |
| | — | | — | | |
| Total .. | 500 | | 75 | (15 | , ,) |
| Control— | | | | | |
| Men .. | 321 | | 5 | (1 | , ,) |
| Women .. | 131 | | 17 | (12 | , ,) |
| | — | | — | | |
| Total .. | 452 | | 22 | (4 | , ,) |

Again we find, as in the case of nasal obstruction, the nasal defect commoner amongst the consumptives, and indeed decidedly more so, being in the case of males eight times as frequent (8 per cent. in consumptives as against

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1 per cent. in controls). Again there is a sex-incidence to be observed both in the tuberculous and in the non-tuberculous group, and also a greater one, amounting to as much as fourfold (30 per cent. as against 8 per cent.) amongst the consumptives, and twelvefold (12 per cent. as against 1 per cent.) in the controls. But whereas nasal obstruction preponderated in men, bilateral atrophy greatly favours women. Again we do not find the observation recorded by the authors mentioned in Chapter II, and again search their protocols for corroboration, the percentage results being as follows:—

| AUTHOR. | CONSUMPTIVES. | |
|----------------------------|---------------|---------|
| | Male. | Female. |
| Harke | 17* | 22* |
| Liaras | 31 | 33 |
| Alexander | 10 | 19 |
| Freudenthal | 12 | 21 |
| Moeller | 5* | 16* |
| Ducos | 44 | 50 |

After this unconscious agreement, it will probably be granted that bilateral intra-nasal atrophy is commoner in female than in male consumptives. The low figures recorded by Moeller are perhaps due to rhinological inexperience; Alexander's and Freudenthal's tally fairly well with the present writer's; the high ones of Mouré's pupils (Liaras and Ducos) we simply note for the present.

As to our observed female sex-incidence of nasal atrophy in non-tuberculous subjects, there are four sources we may draw on for a test. The fullest is that of Frankenberger (94), who examined school children at Prague and found 'einfache Atrophie' in the noses of 20 out of 2,377 girls, but

* All cases of atrophy, bilateral or unilateral, included, since the record is not always decisive on this point.

94. Frankenberger : Cited, without reference, by Treitel : *Archiv f. Laryngologie*, 1904, Bd. XVI.

in only 8 out of more than double the number of boys, adding the natural remark that apparently the female sex is more inclined to simple nasal atrophy, as well as to ozæna. Secondly, there are Harke's 62 non-tuberculous autopsy cases aforementioned—40 men and 22 women; the six cases of bilateral nasal atrophy among them showing three of each sex. Thirdly, there are similarly Schönemann's non-tuberculous cases, which yield 9 cases of double atrophy amongst the 23 males and 5 amongst the 32 females. Lastly, Ducos' control of 24 men and 26 women showed 3 of the former and 2 of the latter. Our finding as regards non-tuberculous persons is thus not confirmed so fully as that regarding consumptives, but still the balance of evidence favours bilateral nasal atrophy being commoner in the female than in the male general population, just as it is commoner in female than in male consumptives. This female sex-incidence of bilateral atrophy quite balances, it will be noticed, the male sex-incidence of nasal obstruction, so that nasal defect as a whole occurs about evenly in the sexes, or rather, according to our table in Chapter III, preponderates a trifle in women, both consumptive and non-tuberculous.

What first suggests itself when we inquire as to the reason of the pronounced sex-incidence of this nasal abnormality, is the well known similar sexual difference in the case of ozæna, a nasal affection also characterized by atrophic change. It is acknowledged and taught that ozæna is more commonly found in women. Herewith we encounter again the question, as in the last chapter over the sex-incidence of nasal obstruction, of facial type. For ozæna is known to favour a broad type of countenance, and chamæprosopia is known to prevail to a certain degree amongst the ozænatous. And chamæprosopia also prevails amongst the consumptives with double intra-nasal atrophy, for the simple reason that these are so often women. Reverting to our measurement of 295 out of the 500 consumptives, we find that 63 per cent. of the women were chamæproscopic as against 41 per cent.

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of the men. One is reminded of Schönemann's remark (*loc. cit.* S. 33) on the results of similar measurements:—

Es zeigt sich also auch hier ein Ueberschuss der Breitgesichter zu Gunsten des weiblichen Geschlechts;

and of Kayser's (95) too—

Das Ueberwiegen des weiblichen Geschlechts bei der Ozæna ist wohl dadurch bedingt, dass bei ihm von Natur die kindliche platyrrhine Nasenform überwiegt.

Sexual type of facial conformation, then, may have something to do with the female incidence of bilateral nasal atrophy in consumptives, just as it may have, as we saw, with the male incidence of nasal obstruction in consumptives. And the chamaeprosopia and platyrrhinia of women may indeed account in good measure for the familiar sex-incidence of ozæna, as Kayser suggests.

Another reason for our finding women so frequently in this 'atrophic' group may be that women stop indoors more than men do. They therefore breathe more continuously an indoor atmosphere, which is comparatively dusty, and the effect on the nose of chronic inhalation of dust is often to produce atrophy.

Further points of kinship exist between the nasal affection we are studying and outright ozæna. Rounded, vertically placed nostrils are a common characteristic of the latter disease; and of the former one too, even independently of sex, as shown in the following table. No corroboration is possible from other records, in which vertical nostrils are not mentioned.

VERTICAL NOSTRILS, PER CENT.

| | | Men. | Women. | Together. |
|---------------------------------|-------|------|--------|-----------|
| Bilateral atrophic consumptives | | None | 11 | 6 |
| All consumptives | | 2 | 7 | 4 |
| All controls | | 0.9 | 1.5 | 1.1 |

95. Kayser: 63 Versammlung deutscher Naturforscher und Aerzte zu Frankfort, September 1896, Laryngologische Abteilung.

Vertical nostrils are thus commoner throughout in women than in men, but also commoner in consumptives with intra-nasal atrophy, except as regards male cases. In these last, the atrophy probably often represented an end stage of the mucosal and submucosal swelling due to nasal obstruction, a point we shall return to when discussing the etiology of consumptives' intra-nasal atrophy.

Possibly a third connexion * may be found between this affection and outright ozæna. Moeller and Rappoport (loc. cit.) stated that when examining bacteriologically the nasal secretion of their subjects, they found the commonest organism in the atrophic cases to be Friedlaender's bacillus. Now, of course, a very frequent micro-organism in ozæna crusts (at one time reckoned therefore as actually causal of the disease) is that variously called *Bacillus mucosus* of Abel, or coco-bacillus of Loewenberg. This bacillus is just a variety of the bacillus of Friedlaender.

Lastly, simple non-fœtid atrophic nasal catarrh (which is what the intra-nasal atrophy of consumptives mostly amounts to) and outright ozæna are probably connected as regards familial incidence,† for Rosenfeld (96) gave a pedigree showing that the descendants of an ozænatous person comprised those with atrophic nasal catarrh as well as those with true ozæna.

* * * * *

The data just obtained, which establish the near relationship of the nasal atrophy of consumptives with ozæna, will be of service when inquiring into the nature and origin—the etiology, in short—of this affection; previous to which, however, it is necessary to treat of

(c) ITS CLINICAL APPEARANCES.

This bilateral atrophy is rarely symmetrical in extent. A common form is where two narrow but slightly unequal

* Yet others appear later.

† See, too, Part III of this essay, under "Heredity."

96. Rosenfeld: *Berichte X International Congress in Berlin*, 1890.

tracts of the posterior naso-pharyngeal wall appear, beginning above on a level with the upper part of the inferior meatus of the nose, and extending rather far down, so that it is necessary, in order to view the whole of them, to make the patient flex the head upon the chest. This is a consequence, of course, of the inferior turbinates being atrophied more often than the middle ones. The extent of naso-pharynx visible varies, but if the patient be directed to swallow, movement of the soft palate can generally be seen. In intensity the atrophy on the two sides is more nearly symmetrical.

The nasal *secretion* is often quite normal, even when there is a good deal of atrophy. Small crusts on the middle turbinals are, however, common. Short of crusting, there may be a generalized dull dryish appearance; or pretty diffuse thin white incrustation with clear moisture standing on the top of it, giving the impression that the mucosa has got dry and then quickly wet again. Exceptionally, save in outright ozæna, is there any pallor of the mucosa. The full picture of ozæna—double atrophy, foetor, thick crusts—is rare; one or other of the three characters, generally foetor, is absent. Lockard's (*loc. cit.*) 49 ozæna cases in 275 consumptives must have included many of simple bilateral atrophy (another proof of the resemblance to ozæna, this writer being a highly competent rhinologist), for the estimates of others are much lower. Liaras saw 2 cases of ozæna in 210 of tuberculous laryngitis. His deduction that real ozæna does not predispose to consumption seems therefore very improbable, because ozæna is nothing like so frequent as 1 per cent. of the general population, as witness my control figures given below; it is perhaps hardly more than 1 per cent. even amongst the patients at a nose, throat, and ear clinic.* Again, since men get laryngeal tuberculosis oftener than women do, many of Liaras' subjects must have been

* This sentence was written many months before seeing D. McKenzie's identical estimate, arrived at from statistics of a Scotch oto-rhino-laryngological clinic.

men, amongst whom ozæna is relatively uncommon. Alexander saw 1 real ozænatous case in 200 consumptives; Moeller, 2 in 120; Ducos, none in 62; Freudenthal, 2 in 232; Behr, 2 in 300 (males); D. McKenzie, 4, "of a mild type," in 102; the present writer 4 in 500. In my control the proportion was 1 case (a woman*) in 452.

The clinical appearances of this nasal affection of consumptives, then, are degrees of intra-nasal atrophy short of, yet connected up with, true ozæna: viz. in a descending order of frequency, atrophy alone, atrophy with slight crusting, atrophy with a fair amount of crusting but no fœtor, lastly ozæna outright.

(d) ANAMNESIS.

| HISTORY. | MEN. | | WOMEN. | |
|---------------------------------------------|-------------|----------|-------------|-----------|
| | Phthisical. | Control. | Phthisical. | Control. |
| | | | Per cent. | Per cent. |
| Of epistaxis | 2 | 0·3 | 4·9 | 1·5 |
| Of previous rhinological treatment | None | None | 2 | None |
| Of trauma to the nose .. | None | None | None | None |
| Of getting crusts from the nose | 1·3 | 0·3 | 7·8 | 0·7 |

The semeiology of this group is seen to be what one would expect. The effect of a dry atrophic rhinitis is to produce nasal crusting and bleeding, which are what the patients mostly complained of. In the cases considered in the last chapter these symptoms were seen to be the contribution chiefly of those which showed unilateral nasal atrophic change. In the present ones they are due to

* It is interesting to observe that the preference of ozæna for the female sex holds good also in ozæna complicated with consumption. Brindel's case was a male; Alexander's a woman, although many more men than women were examined. Similarly Moeller in 72 men and 48 women found two cases, of whom one was certainly, the other probably, a woman. In Freudenthal's protocol the percentage is—men 0·8, women 2·6; in my present material it is men 0·2, women 2·1. Behr's consumptives were all men, and here the percentage is 0·6.

bilateral atrophy; and in all probability the liability of consumptives to intra-nasal atrophy (and, as we see later, to rhinitis sicca) is the reason why epistaxis has long been recognized as a mark of the candidate for phthisis. In the above table there is further to be observed the preponderance in women of the nasal affection in question, although the signs of this are to be discounted a little by reason of the fact that women remember their symptoms better than men do. Nevertheless, as we saw in the previous chapter, in the case of symptoms and history characteristic of nasal obstruction they had much less to say than the men. Lastly, of the consumptives in this 'atrophic' section who were able to date their symptoms, 18 (8 men and 10 women) gave a history of nasal symptoms preceding pulmonary ones, as against 8 (2 men and 6 women) who said the opposite.

(e) ETIOLOGY.

Is this particular nasal condition of consumptives—

- (1) Itself tuberculous, or at any rate in origin tuber-culo-toxic? or
- (2) Due to the malnutrition incident to consumption? or
- (3) Both non-tuberculous, and, in great part, antecedent to the consumption, and so in all likelihood a predisposing cause of the same?

(1) *Is it tuberculous?*

Against this there are the already cited results of microscopical examination or of cultural or inoculation experiments, made (by Liaras, Moeller, Ducos, and Caboche) from the nasal secretion or from the atrophied turbinals themselves. These all turned out negative, although the last-named author, at any rate, was expecting a positive result. However, we know it is often hard to demonstrate tubercle bacilli in, for example, lupoid lesions; and further that the theory that tissues may be changed as the result of tuberculous infection, without characteristic patho-

logical appearances of tubercle—the theory of ‘tuberculosis without tubercle’—is held (Poncet, Landouzy) in France, though it lacks as yet final proof. Accordingly, to test whether it can apply in the present instance one must fall back upon indirect evidence. Why, then, should this one mucosa, out of all those in the body, be the one to be attacked? The conjunctiva is almost as much exposed to aerial infection. Why, when a consumptive with endonasal atrophy reacts to tuberculin, does one never encounter nasal symptoms—observe, that is, a focal reaction within the nose? Why is the atrophy seen in apparently healthy controls? Then, arguing from analogy, we find that ozæna, a closely similar condition, is also commoner in consumptives than in healthy persons, and that nevertheless the belief in its tuberculous nature is, as we have seen, being less and less held, for reasons other than the recent vogue of Perez’ bacteriological work. Further, if the action on the nasal mucosa of tuberculosis, or of tuberculo-toxæmia, is to produce atrophy, what of the obstructive conditions from deformity of the bony or cartilaginous framework of the nose which are also disproportionately frequent amongst the phthisical? These can hardly be tuberculo-toxic too. Tuberculous toxæmia will not explain the frequency in consumption of both atrophy and nasal obstruction, whereas, as we discuss later in Chapter VIII, impairment of physiological nasal respiration will.

Such are some of the difficulties involved in the view that the intra-nasal atrophy of these subjects is due to their tuberculosis. There exist, however, a couple of arguments for the tuberculous nature of this condition, one of which is that something apparently identical is often seen previous to facial or to intra-nasal lupus. This statement rests on the authority of the dermatologist Dubreuilh (97) and of Moure, they being now supported by other French* rhinologists (Caboche, Dresch); illus-

97. Dubreuilh: Cited by Ducos (*loc. cit.*).

* Rhinological literature other than French seems silent upon this point. It is, of course, stated that facial lupus may begin intra-nasally as primary

trative cases are given in Liaras' thesis. My experience has been to confirm it. All facial lupus patients do not show preliminary endonasal atrophy, nor do all patients with intra-nasal tuberculosis. Here, however, are two cases in point:—

At a sanatorium a probationer nurse was engaged who had given up music-teaching on account of general ill-health. She soon consulted me for a small nasal trouble she had had for some time, consisting in occasional small crusts from the nose and slight epistaxis, with excoriation of one nostril. I found slight eczema introitus narium (which soon after healed), thin intra-nasal crusting, and the naso-pharynx rather widely visible from the front on both sides. There were no pulmonary physical signs, but I looked on the atrophic nasal condition as evidence of a phthisical tendency, which tendency an open-air life would keep in check. The general condition and health improved greatly, but in a year's time she got a small patch of skin lupus on the tip of the nose, the diagnosis being confirmed by a dermatologist. There were no lupoid nodules visible intra-nasally, however, although epiphora soon supervened, very likely from the contraction of the atrophic nasal mucosa blocking the lower end of the nasal duct.

This case recalls Dubreuilh's words when he speaks of facial lupus being preceded by a nasal affection not truly lupic, but rather in the nature of '*une sorte de catarrhe tuberculeux sans tendance néoplasique*,' which '*peut se propager aux voies lachrymales* [by way, of course, of the nasal duct] *et déterminer une dacryocystite chronique*.' This chronic dacryocystitis may surely, however, be of the usual type and due to blocking of the lower end of the nasal duct as just described, from contraction of the nasal mucosa; for ophthalmologists describe dacryocystitis from a similar stenosis caused by ozaena (another point of kinship, by the way, of consumptives' nasal atrophy with this disease). In the case just cited there was no clear evidence of tuberculosis of the tear sac or duct; and of course dacryocystitis complicating nasal atrophy is no proof of the tuberculous nature of the latter.

Again—

A male consumptive with positive sputum gave a history of getting crusts from the nose, especially the right side, for at any rate twenty years. He had

declared lupus inside the nose; but there is no mention of any preliminary endonasal atrophy.

had lupus of the skin of the bridge of the nose (visible in the appended photograph) for thirteen, and chest symptoms for ten years.

On rhinoscopy, merely crusting and atrophy in the right nasal fossa; no lupus internally. Here, in all probability, the sequence—of course not causal in all its links—was first intra-nasal atrophy, as evidenced by the discharge of crusts; secondly, facial lupus; thirdly, pulmonary tubercle.

It was probably observation of this dry, atrophic rhinitis preceding lupus that made Moure remark (perhaps via a case like the one above) the nasal atrophy of consumptives and of surgical tuberculous patients. To see the condition first in such close association with lupus—indeed in the case of intra-nasal lupus affecting the very same tissues—would of course raise strong suspicion of its tuberculous character. Hence, perhaps, his inspiration of others to the necessary inoculation and cultural experiments we have cited, which, so far as they went, all resulted negatively.

The second argument in favour of the endonasal atrophy of consumptives being tuberculous is as who should say: This nasal condition, you state, is commoner in women than in men. Well, intra-nasal tuberculosis and intra-nasal lupus are likewise commoner in women than in men.* The intra-nasal atrophic condition of tuberculous subjects is just a stage, an attenuated manifestation, perhaps, of intra-nasal tubercle.

The proper answer to these two objections seems to the writer to be that intra-nasal atrophy, itself non-tuberculous, can predispose to all three diseases: pulmonary tuberculosis, facial lupus, and intra-nasal tuberculosis. In the first case (the nurse) the intra-nasal atrophy, which had preceded the facial lupus, predisposed to it. In the second one, the nasal atrophy of twenty years' standing entailed first the facial lupus, and then, after an interval, the consumption too. Since, then, intra-nasal atrophy is commoner in women, so also are its possible consequences, intra-nasal tuberculosis and facial lupus, which latter often begins

* For a good summary of evidence establishing this see Lockard (loc. cit., pp. 277, 278), also Steward: *Guy's Hospital Reports*, London, 1900, liv. p. 149.



[As supporting the theory of pathogeny of lupus here stated, one might cite Cobbett (*Causes of Tuberculosis*, 1917, p. 634), who describes bacilli of the human—and therefore aërogenous—type as being commoner in the lupus of female than of male patients.]

intra-nasally. Why, then, it may be said, does not the third possible consequence—namely consumption—also favour women? Probably because chronic nasal obstruction also predisposes to consumption, and when it does is, as we have shown, commoner in men—thus balancing, as already noted, the phthisical predisposition women have in virtue of their liability to intra-nasal atrophic change. And nasal obstruction, though obviously it can predispose to consumption, is not likely to predispose to tuberculosis or lupus in the nasal passages, for its effect is to exclude them from the atmosphere, not to throw them too widely open to it, with consequent chance of deposition inside the nose of aerial tubercle bacilli. Such deposition may well be a different affair when taking place in atrophic nasal passages than when occurring in normal ones. The over-wide nasal chambers of the subjects of intra-nasal atrophy, from their dryness and from the lessened emunctory facilities they afford (the expulsive stream of air not being concentrated enough), favour incomplete removal of aerial tubercle bacilli deposited in them. Moreover, more or less desiccated nasal secretion would lose to some extent both its anti-bacterial power and its mechanical ‘flushing’ effect. In time these aerial tubercle bacilli might infect the mucosa, giving rise to the practically identical conditions, intra-nasal tuberculosis and intra-nasal lupus (from which, again, facial lupus may arise*); or penetrate it, gain the lymphatics, and become lodged in neighbouring tracts of skin, giving rise to facial lupus directly, as may well have happened in the two cases communicated above. Cornet and others have, of course, established that tubercle bacilli can traverse a mucous membrane (including the nasal mucosa) without leaving trace of their passage. In support of this theory of pathogeny one finds Piorry’s (98) observation that cutting off the vibrissæ at the entrance of

* Compare the teaching that one should refrain from vigorous curetting of intra-nasal lupus as likely to be followed by the development of lupus of the skin of the face.

98. Piorry: *Traité de Diagnostic*, t. i. p. 387.

the nostrils (removing, that is, a kind of coarse filter) is often followed by erysipelas of the skin of the nose. What holds good for the streptococcus may hold good also for the bacillus of Koch, for we must remember that the vibrissæ are less well developed in women; even, according to Ducos, in tuberculous subjects generally. Again, the known preference for women of lupus erythematosus, a disease which has strong affinities to tubercle and which affects the skin of the nose and face, is explicable on similar lines to those indicated above. *A priori*, too, the effects of qualitative derangement of a busy physiological function like nasal respiration, may well be of a curiously detailed and intricate nature, while the explanation of the findings we have given is simpler than supposing endonasal atrophy to be a hitherto undescribed manifestation of nasal tuberculosis, exceedingly unlike the usual ones.

It seems needless, therefore, to regard, with Escat (99), the atrophic nasal conditions of the tuberculous as a sort of larval lupus or tuberculosis of the Schneiderian membrane. In ten years I have seen many consumptives with nasal atrophy, but have never heard of one of them subsequently developing intra-nasal lupus. The wide prevalence of consumption, the great rarity of intra-nasal tuberculosis, is a contrast which speaks for itself. Nor is atrophic change described as preceding tuberculosis of any other mucous membrane in the body. Such is peculiar to the nasal one.

It is submitted, then, that the intra-nasal atrophy of consumptives is no result of tuberculosis.

Here may be noticed the afore-mentioned (in Chapter I) investigation of D. McKenzie, Mackeith, and Wingrave, who tentatively conclude that ozæna is a manifestation of tuberculosis.

The main reasons they adduce for this view are the following:—

1. That the theory that the ozæna always precedes and predisposes to the tuberculosis is negatived by the existence

99. Escat: Cited by Slavtcheff (*loc. cit.*).

of a family history of tuberculosis in so many cases of ozæna, a proportion greater than can be accounted for by familial ozæna. The answer here is the existence in the relatives of ozæna patients of other nasal defect, especially simple atrophic rhinitis. See the communications of Pluder (46), Rosenfeld (93), and the section on heredity and familial incidence in Part IV of this book.

2. That 94, perhaps 100, per cent. of their ozæna cases responded positively, largely to the subcutaneous tuberculin test, and that in several instances a focal (nasal) reaction of the ozæratous tissues was observed. It is overlooked that the subcutaneous test is being given up; Bandelier and Roepke have lately disclaimed faith in any non-focal tuberculin reaction other than the intra-dermal one—which, as McKenzie mentions, showed in the hands of Caldera, in a large total of ozæna cases, a positive result in only 23 per cent. of cases. In a review of German sanatoriums (the native country of tuberculin diagnosis) for 1914 it is stated :—

Die subkutane Tuberkulinprobe zur Sicherung der Diagnose ist Z. B. von Schröder schon lange abgelehnt worden, neuerdings hat auch die Landesversicherungsanstalt der Hansastädte angeordnet, dass nicht in jedem zweifelhaften Falle die Probe angestellt wird, sondern nur in geeigneten Fällen. Infolgedessen wurde in ihren Anstalten ein Rückgang der Subkutan-Proben beobachtet.*

True focal reaction would, however, certainly have been diagnostic of the tuberculous nature of ozæna. But were these focal reactions? Some came on within an hour or two, which is far too soon to be typical. Again, they are described as having manifested themselves by liquefaction of the nasal discharge. A true focal reaction shows the signs of inflammation: it is a thing to warn the patient against, lest he become resentful when it occurs. The one instance in which McKenzie reports a 'very decided focal reaction' (which was doubtless genuine) turned out to be nasal lupus.

* "Aus deutschen Heilstätten, 1914," *Internationales Centralblatt f. d. g. Tuberkulose-Forschung*, February 1916, S. 63.

3. Clinical improvement, short of cure, under tuberculin treatment.

This claim must be left to the formidable test of time. For yet another connexion between ozæna and phthisis is this, that in both the tale of special remedies discarded is of immense length. Lately salvarsan has been extolled for ozæna, while the Italian section of the international investigators praise auto-vaccines from Perez' cocco-bacillus, which organism an experienced rhino-pathologist like Wingrave here declares to be only an occasional attendant of the disease.

4. That the acid-fast bacillus mentioned above conforms to two of Koch's postulates as regards ozæna, and has close morphological and tinctorial resemblance to the tubercle bacillus.

As the author says, two postulates remain to be fulfilled. This interesting investigation, not yet complete, must of course demonstrate immunity and "Allergie" production to tubercle before the identity of the two bacilli can be accepted, beside other points.

(2) *Is it, then, a result of the malnutrition frequent in consumption?*

Alexander, speaking of an atrophic rhinitis of marasmic subjects, supposed this to be fairly often the case. So did Liaras. So, more frequently, did Bourgeois (100) in a criticism of Ducos' thesis, and so did D. McKenzie (*loc. cit.*). The reasons for largely discrediting it are, firstly, the fact that, as we have seen, atrophy may occur in healthy people in good condition; actually in 4 per cent. of my controls. Secondly, the common event is, when a definite history is obtainable, to find nasal symptoms antedating pulmonary ones, rather than the converse. In these present cases, as was mentioned under anamnesis, the proportion is 18 cases with nasal symptoms first to 8 with pulmonary symptoms first, or 2·25 to 1. In the cases one can gather from lengthy analysis of the literature it is nearly

100. Bourgeois: *Press Médicale*, 23 December 1905.

3 to 1. This although a patient remembers chest symptoms better than nasal ones, as seeming to him decidedly more important and relevant; this although he remembers all symptoms occurring subsequently to his falling ill with his chest much better than those occurring when he felt in good health; and this although the anaemia of phthisis does seem to favour a dry state of the nose, with consequent liability to epistaxis (often when washing the face in the morning), just as any other anaemia does. These three factors should form enough of a counterpoise to subconscious mental bias of the investigator when obtaining the anamnesis.

Thirdly and fourthly, there are the failure of improved nutrition to alter the atrophy—repeatedly I have re-examined these patients after an interval marked by great gain in weight, occasionally when heavier than ever before in their lives, and found it unaltered—and Ducos' finding atrophy (*sui generis*, however) oftener in pleurisy than in consumption itself; whilst from his controls, and from the autopsies of Harke and of Schönemann, one can gather 16 cases of cancer, of whom only 2 are stated to show nasal atrophy. If this condition were often the result of malnutrition, the proportion should have been much higher.

Fifthly, absence in consumption of a similar change in other mucosæ; and sixthly, malnutrition not commoner in female than in male consumptives, while intra-nasal atrophy is.

Malnutrition as to any large extent the cause (it probably has a small effect) can therefore be excluded. Several of the above arguments clearly hold also against tuberculosis as a cause.

(3) *Is the endonasal atrophy non-tuberculous, largely antecedent to the consumption, and thus in all likelihood an element in a phthisical diathesis?*

Much of what has already been replied to questions (1) and (2) will have foreshadowed this conclusion. But before

adding to our arguments, we can no longer defer noticing the opinions of Moure, whose position as a rhinologist naturally makes them important. Moure believes that the atrophic endonasal condition common in the tuberculous consists in (1) *Coryza pseudo-atrophique tuberculeux*, seen in consumptives; and (2) *Coryza pseudo-atrophique strumeux*, seen in surgical tubercle and previous to facial and intranasal lupus. These affections constitute a 'rhinopathy' special to these subjects; nevertheless they are themselves non-tuberculous, and precede the tuberculous disease, although, in consumptives at any rate, often progressing *pari passu*, once that is established. The direction of this progression is towards increase of the atrophy. In early consumption there may even be hypertrophy of the turbinals, replaced later, as the chest affection advances, by atrophy. Thus all non-tuberculous abnormal nasal states in consumptives are embraced in the one disease, pseudo-atrophic rhinitis.

This generalization, remembering its source, is to be carefully borne in mind, and with it every new finding in the study of our subject has to be compared. Nevertheless the criticism one must make immediately is that this author has against him the strong evidence that deformity of the bony and cartilaginous framework of the nose, like septal deviation, dislocation of the septal cartilage, spurs, and protrusion of the superior incisors, are commoner in consumptives than in healthy persons. Nearly every record when looked into goes to confirm on this point (one recalls, too, the great preponderance in consumptives of a history of nasal trauma, seen in the last chapter), which invalidates altogether the rôle Moure assigns to changes in the turbinals and the nasal mucosa as the exclusive source of all non-tuberculous nasal abnormality in consumptives. Next, an important feature of 'coryza pseudo-atrophique tuberculeux,' namely thin white crusting on either side of the front of the septum, where the inspiratory air-current first strikes, one finds very frequently in normals of the working-class. Hence, perhaps, the large total of rhino-

pathological change which Moure and his pupils describe in consumption, a proportion much higher, as will have been noticed, than in any other author's estimate. Nor does one find pronounced atrophic change (for so he would deem any appearance of the naso-pharyngeal wall on anterior rhinoscopy) so specially rife in advanced consumption as he does. Thus, our 500 consumptives are made up of 359 men and 141 women. The 359 males fall as regards their chest disease into the three Turban-Gerhardt stages as follows:—

| | | | | | |
|---------|------|----|----|----|--------------------|
| Stadium | I. | .. | .. | .. | 62 or 17 per cent. |
| " | II. | .. | .. | .. | 203 or 56 " |
| " | III. | .. | .. | .. | 94 or 26 " |

As against this, the 32 males with bilateral nasal atrophy are similarly divided into—

| | | | | | |
|---------|------|----|----|----|-------------|
| Stadium | I. | .. | .. | .. | 6 per cent. |
| " | II. | .. | .. | .. | 53 " |
| " | III. | .. | .. | .. | 40 " |

while the 141 women come out:—

| | | | | | |
|---------|------|----|----|----|--------------|
| Stadium | I. | .. | .. | .. | 10 per cent. |
| " | II. | .. | .. | .. | 57 " |
| " | III. | .. | .. | .. | 31 " |

and their sub-group of 43 with bilateral atrophy—

| | | | | | |
|---------|------|----|----|----|--------------|
| Stadium | I. | .. | .. | .. | 13 per cent. |
| " | II. | .. | .. | .. | 51 " |
| " | III. | .. | .. | .. | 34 " |

Thus the 'atrophic' males show distinctly more of advanced consumption than do the general average of their sex; and the 'atrophic' females about the same as theirs. The women with atrophy, indeed, have more first-stage consumption to show than has the whole female material. If we make a comparison in respect of age, we find a similar state of affairs. If marked atrophy be associated with the later periods of phthisis, then those in whose nasal passages it is found will be on an average a little older than other consumptives. The average age of

the males with bilateral nasal atrophy is 32·2 years, and of the women 27·2. In the rest of the material these figures are respectively 30·3 and 26·2. Here, again, the divergence from the average is greater in the case of the men. The association of marked nasal atrophy with advanced consumption is then somewhat of a male trait, a finding which will help us, in the next paragraph, to an explanation other than that of postulating some special accelerating influence of tuberculous disease elsewhere upon the nasal affection ; of postulating a parallel march of the two diseases. Extensive endonasal atrophy may be seen in little girls under twelve years old * with no very severe lung tuberculosis. In one such case, showing all the physiognomy of ozæna, it seemed evident that with the onset of puberty that disease would develop, were not active nasal treatment kept up, and a warning to this effect was given to the practitioner who had sent the case to the dispensary. The case figured as a frontispiece to this Part is another one in point. Then, too, a little weight must be given to the effect of the malnutrition and pyrexia of advanced phthisis in promoting intra-nasal atrophy, particularly, perhaps, by virtue of the characteristic continuously increased frequency of respiration, which must throw extra work on the already inadequate nasal mucosa. Lastly, the strong affinities of the nasal atrophy of consumptives to ozæna count against Moure's conception of it as a special rhinopathological condition of itself, peculiar to tuberculous subjects.

On the other hand, conditions known to lead to intra-nasal atrophy in general, conditions which have nothing to do with tuberculosis, are found associated with the affection now under notice. First, nasal atrophy may sometimes be an end stage of nasal hypertrophy. Certain authorities state that hyperplasia, if sufficiently prolonged, always shows histological changes associated with atrophy, and that chronic hypertrophic rhinitis may terminate in simple atrophy, without crusts or fœtor. This would

* I have seen it in one aged four.

explain the transition of hypertrophic rhinitis in early phthisis to an atrophic condition in the end stages of a chronic consumption, quite independently of any tuberculo-toxic influence. Many, too, accept Bosworth's theory that ozæna often begins in a purulent rhinitis in childhood. In the present cases, there seemed no reason to suppose that a puerile purulent rhinitis, scrofulous or other, had existed with any special frequency, but in about a sixth of them (6 men, 7 women) there was plain evidence of former nasal obstruction, such as a history of operation for adenoids, the existence of septal deviation, external nasal deformity, or protrusion of the upper incisors. These cases suggested that there had existed in childhood nasal obstruction with the very frequently associated hyperplastic or chronic hypertrophic rhinitis, which rhinitis had, by the time early adult life was reached, ended in bilateral atrophy. Since men are more subject than women to nasal obstruction, we may get an explanation here of the finding given in the last paragraph that it is especially in men that bilateral endonasal atrophy is found with Stadium III pulmonary disease and with an age above average. Moure has said, too, that his pseudo-atrophic rhinitis of the tuberculous is found frequently in subjects showing traces of past adenoids. Lastly, some of the cases dealt with in last chapter showed dryness, and even atrophy, on the obstructed side. Nasal patients like this may be seen at throat hospitals, and rhinologists refrain from operation, fearing to replace unilateral obstruction with "the horrors of a dry nose."

Again, the persistent continuance of any purulent nasal discharge is known to be associated with atrophy, partly through the chronic irritation of the mucosa contact with it sets up, provoking first hypertrophy and then atrophy, and partly by the local pressure of the crusts which are apt to form from it. There were further present in this section two cases of sinusitis (out of 75, a proportion higher than that in the rest of the material—yet another point of relationship with ozæna, for ozæna is often complicated

with sinusitis) in which the atrophy may have been partly caused in this way.

Another established pathogeny of intra-nasal atrophy, touched on before when considering reasons for its sex-incidence, is that of special exposure to dust, particularly a gritty dust. The work of Roepeke (101) may be adduced here. In his book on occupational diseases of the upper air passages, it is noted that metal grinders, with scarcely an exception, suffer from inflammation and swelling of the nasal mucosa, which after a time becomes atrophic. In the report of a governmental inquiry into the health of the grinders of Solingen, the German Sheffield or Pittsburgh, men whose phthisis mortality was double that of the rest of the population of the neighbourhood, one notes nasal atrophy mentioned in the protocol in 23·4 per cent. of all cases, and in 26 per cent. of the consumptives. Brauer (102), too, describes the upper respiratory passages of cigar-workers (whose phthisis morbidity rate was nearly twice that of other adults) as commonly affected with "häufig zu Schleimhautatrophie fuhrenden chronischen Nasen- und Kehlkopfkatarrhe." Here again we perceive that the intra-nasal atrophy of consumptives may own the same causes as any other slight atrophic intra-nasal affection. And when we seek for signs of this source of nasal atrophy in our present material, we turn first of course to the occupations of the 32 males in this section.

They are as follows:—

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Collier | 8 |
| Labourer (one of these had managed a brickyard for sixteen years) | 6 |
| Stonemason | 2 |
| Ex-quarryman, gold-miner (South Africa, rock-drilling), sand-moulder, publican, warehouseman, fitter, bank clerk, gardener, chemist's assistant, farmer, cotton-worker, pattern-maker, printer, turner, waiter, bricklayer, 1 each | 16 |
| | 32 |

101. Roepke: *Berufskrankheiten des Ohres und der oberen Luftwege*, Wiesbaden, 1902. Moritz u. Roepke: *Zeitschrift f. Hygiene und Infektionskrankheiten*, Bd. XXXI, S. 231.

102. Brauer: Bericht über den Tuberkulose Congress Berlin, 1899, S. 140.

Here the uncontestedly dusty occupations are collier, stonemason, quarryman, gold-miner, bricklayer; of which the last four are concerned with gritty dust. The comparative percentage frequency of occurrence of these occupations in this 'atrophic' group and in the rest of the male consumptives is given in the following table. The number of colliers is due to the writer's work having lain largely in two North of England coal centres :—

| | Collier. | Stone-mason. | Quarry-man. | Gold-miner. | Brick-layer. |
|-----------------------------------------------------------|----------|--------------|-------------|-------------|--------------|
| Male consumptives with bilateral nasal atrophy (32) | 25 | 6 | 3 | 3 | 3 |
| Other male consumptives (327) .. | 8 | 0·3 | 3 | 0 | 0·6 |

So that the male consumptives of the 'atrophic' group showed far more than their share of dusty occupations, whether the dust in question were of a soft consistence, like coal particles, or hard and cutting, like those from stone or brick.

Lastly, there is occasionally in phthisis a huge nasal atrophy due to the ravages of intra-nasal tertiary syphilis. There happens not to be a case of the kind in the present material, perhaps because these subjects get into Poor Law infirmaries or similar institutions, but I have seen (one in a sanatorium) two such cases, with negative sputum, and one of them died of tuberculous meningitis. In Harke's protocol several such are recorded, as was mentioned before when we touched on the point of septal perforation in consumptives.

* * * *

In sum, then, the balance of evidence is in favour of the nasal affection being the antecedent, with consumption as its consequent. Moreover, this intra-nasal atrophy seems of no special kind, but to arise as any nasal atrophy does, and in particular to possess strong affinities to ozæna—attenuated, frustrate, or early forms of which it probably

represents. It would appear, indeed, to be just the simple (as opposed to foetid) atrophic rhinitis described by various rhinologists, such as Demme (*loc. cit.*) and Seifert (103), and to present every degree of severity from slight shrinkage of the nasal mucosa up to a condition which has been well compared by Alexander to ‘*ozæna* cured in the clinical sense of the word.’ Completing the series there occur a few (but proportionately over-numerous) cases of *ozæna* itself.

(f) TREATMENT.

We have seen in Chapter I how Ziem some time ago pointed out the incongruity of giving certain consumptives specific treatment while no notice was taken of such things as muco-purulent nasal discharges. His criticism holds good, it is to be feared, just as much at the present day. Especially was this the case during the recent vogue of the therapeutic suction-mask of Kühn, which was worn over the nose and mouth and caused the patient to inspire against resistance. Muco-purulent crusts in the nose, or the secretion of post-nasal catarrh, were thus often encouraged to travel down to the larynx and trachea.

However, in the treatment of consumptives’ nasal atrophy, just as in the treatment of consumptives’ nasal obstruction, no sudden improvement in the general, much less the pulmonary, condition is to be looked for, not even when an ozænatous nose is cleansed and made sweet. None the less, such a procedure is urgently indicated, and certainly gives the patient a feeling of relief and comfort. In dispensary practice, with young subjects especially, the general condition may respond in the course of a month or two very favourably indeed to nasal treatment. The writer’s practice in *ozæna* has been to soften crusts with hydrogen peroxide, then to syringe out with an alkaline collunarium, and then to pack with double cyanide ribbon gauze for an hour or so, when removal and a final syringing complete the cleansing and do away with all odour; there is no need to reckon *ozæna*,

103. Seifert: *Berichte X International Congress in Berlin, 1890.*

with Kaurin (*loc. cit.*), a bar to admission to a sanatorium. After this the patient is taught to syringe gently every day with a Higginson's syringe, fitted with a perforated rubber teat, using normal saline solution; and in order to impress the importance of perseverance the instruction given is—"for the rest of your life."

The commoner atrophic conditions which do not amount to ozæna can be met with less thorough measures. Sniffing the collunarium from the hand (apparatus other than a Higginson is unnecessary) will often replace syringing, at any rate after a little time, and occasionally stopping the nostrils by day with an obturator of cotton-wool will 'rest' the interior of the nose and lessen its dryness. As this entails mouth-breathing, the method is probably only justifiable when the patient is in the pure air of the sanatorium. The more elaborate therapeutic procedures against nasal atrophy, which, too, are not very efficacious, seem, in view of the pulmonary disease, hardly worth while. The treatment of sinusitis, when that exists, we notice later. Epistaxis requires the ordinary special treatment of that affection, failing which tuberculous children may lose a good deal of blood needlessly. In general, syringing out the nose, or douching it from the hand, is the foundation measure, and it is simple to carry out and harmless.

Lastly, nasal atrophy and dryness give us a definite, rational climatic indication in the treatment of consumption. Other things being equal,* a consumptive with these nasal conditions will do better in the moist air of a marine climate than elsewhere, just as an ozænatous subject will.

* A reservation to be borne in mind. The high winds prevalent at many seaside places in winter make them rather unsuitable for all but well arrested pulmonary phthisis. For the same reason and other ones, such as the absence of special medical supervision and of opportunities for exercise, this also applies to sea-voyages.

CHAPTER VI

OTHER NON-TUBERCULOUS NASAL AFFECTIONS OF CONSUMPTIVES

HAVING discussed nasal obstruction and bilateral intra-nasal atrophy, we bring the remaining rhino-pathological cases together into a third group, before going on to treat of those consumptives whose nasal condition seemed normal.

This third group, being small and not so homogeneous as the two previously mentioned, might be called 'Various.' It comprises 50 male and 13 female consumptives, as against 30 and 16 of the controls, being thus commoner, like the obstructive and atrophic cases, in the tuberculous subjects. It is made up mostly of cases of unilateral atrophy (nasopharyngeal wall visible on one side on anterior rhinoscopy) uncomplicated by nasal obstruction, but often accompanied by dryness of the nose and a tendency to epistaxis. There are then a few cases of rhinitis sicca (dryness and slight crusting minus atrophy); a few showing dilated venules or bleeding spots upon the septum; one or two of chronic rhinitis; and one (in both consumptives and controls) of sinusitis not entailing nasal obstruction. Lastly there is one case (a male) of nasal tuberculosis, of course amongst the consumptives, and the only instance of this disease met with in the whole material.

The ANAMNESIS referred chiefly to epistaxis, and to the discharge of crusts from the nose. Twenty-five of the consumptives were able to date their nasal symptoms, and 20 of these (16 men, 4 women) gave a history of nasal symptoms preceding pulmonary ones; and 5 (all men) a history of the opposite state of affairs.

The two cases of sinusitis conclude those met with in our material, and this complication might therefore now be considered. But before this is done the ground of discussion must first be cleared by excluding from it nasal sinusitis occurring in the non-tuberculous, and giving rise in them to signs and symptoms mimicking pulmonary phthisis with a very misleading fidelity. We have already noted at the beginning of Chapter IV that mouth-breathing with consequent inhalation of dust sometimes causes a chest condition which is non-tuberculous—or rather, perhaps, pre-tuberculous—and easilymistakable for phthisis. Rather similarly, inhalation of purulent discharges of various kinds proceeding from the upper air-passages has been charged with setting up an apical pulmonary lesion the non-tuberculous nature of which often goes unrecognized.

That the pus from sinusitis could cause chest complications was of course known to earlier rhinologists, e.g. Lennox Browne. Friedrich (104) in his book on the inter-relations of laryngology and internal medicine expresses the fact thus :—

Am häufigsten stellen sich als Folgezustände derselben chronische Bronchitiden ein, die besonders hartnäckig in den Fällen von chronischer Nebenhöhleneiterung sind, in denen der Eiter vom Nasopharynx aus in die tieferen Luftwege herabsickert und dort chronische Reizzustände setzt.

But the first writer to mention the predilection of this affection for the *apex* of the lung, with the consequent strong resemblance to consumption, seems to be Martin du Magny (105), who claimed that all suppurations of the upper respiratory passages, including otitis media, might exactly simulate signs of consumption from the pus flowing down the trachea, generally at night, and causing an apical septic infection in the neighbourhood of the main bronchiole of the lung of the side the patient sleeps on. He did not explain why the apex alone should suffer, but this is likely from the

104. Friedrich: *Rhinologie, Laryngologie, und Otologie in ihrer Bedeutung f. die allgemeine Medicin*, Leipzig, 1899, S. 13.

105. du Magny: *Bulletin médicale*, 3 July 1901.

known deficient expulsive action occurring at the pulmonary apex, by reason of its extra-thoracic position and other anatomical characteristics. The pus might invade the lung fairly evenly, but would be readily coughed up again from parts other than the apex.

Lack (*loc. cit.*), as also Mackie (106), state that the discharges from an empyema of the maxillary antrum may cause both signs and symptoms of active phthisis, which clear up under nasal treatment.

Chauvet (107) gave 62 observations supporting the idea of his master du Magny. He considered the commonest spot in which to find evidence of the pulmonary lesion was near the supero-internal angle of the scapula.

At the beginning of Chapter IV we mentioned cases of the kind reported by Blümel and by Schönemann.

Camac Wilkinson (108) described confusion of the pulmonary results of nasal sinusitis with consumption, and St. Clair Thomson (109) said that before the days of bacteriological sputum analysis consumption was sometimes diagnosed on the inspection of expectorated pus which had first descended from the nasal sinuses. He also cited an instance in which he considered maxillary sinusitis responsible for pleurisy.

The present writer has the following cases to communicate, all of which were being treated as consumption.

1. C. O., male, *æt.* 21. *Pulmonary signs* of slight generalized bronchitis, which soon cleared up, and of fibrosis (diminished resonance and prolonged expiration) at the left apex. *Symptoms* dated from eight months back: cough, spit occasionally blood-streaked, dyspnoea, night-sweats—he had been outpatient at two London hospitals. Repeated sputum examination, with and without concentration methods, and before and after discharge from a consumption hospital, proved negative. He had volunteered no history of nasal trouble, and only in answer to leading questions owned to a bilateral purulent discharge for at least a year; this greenish nasal discharge looked exactly like the pulmonary expectoration and was likewise free from tubercle bacilli. He

106. Mackie: *The Lancet*, 31 March 1906.

107. Chauvet: *Revue de Moure*, 20 March 1909.

108. Camac Wilkinson: *Tuberculin in Diagnosis and Treatment*, London, 1912, p. 87.

109. St. Clair Thomson: *The Practitioner*, June 1914.

had adenoids and chronic blepharitis. To transillumination the patient was dark on both sides, but left-sided alveolar puncture proving negative, treatment was confined to removing the adenoids and keeping the nose clean with syringing. On discharge I sent him to a special hospital, when pus was found in the other maxillary antrum; but while waiting for admission, when no doubt he neglected nasal irrigation, the cough got worse and he was confined to bed. A heavy extension of physical signs took place, the right side of the chest, before and just after operation on the maxillary antra, being dull to percussion and full of moist sounds. The state of his general health did not at all suggest, however, that tubercle was responsible for this condition, nor the fact that in a month it had disappeared, together with the foulness of the nasal discharge present at the time of operation, leaving the original physical signs of apical fibrosis. Fourteen months after date of discharge from the consumption hospital, the mother voluntarily wrote me to say his general health was excellent, nasal condition and blepharitis much improved, and that he was seeking work.

2. A. M'G., factory girl, æt. 22. Indefinite physical signs at right apex. *Symptoms*: Cough, hoarseness, loss of weight, dating for a year back. No sputum; ophthalmic-reaction to tuberculin negative; her father died of phthisis. *Nasal condition* at first seemed to be atrophic rhinitis, but soon double, chiefly right-sided, sphenoidal sinus suppuration was provisionally diagnosed, the secretion re-collecting in the superior nasal meatus very soon after removal by syringing. On questioning, a history of bad-smelling crusts from the nose was disclosed. On discharge from the consumption hospital I sent her to a laryngological clinic, where the right middle turbinate was removed and the anterior wall of the sphenoidal sinus broken down. The result was the usual one with all operations for sphenoidal sinusitis, that is, not too good, although eventually the nasal condition gave little trouble. The patient returned to work, and later married and bore three healthy children. In 1916, or eight years after first seeing her, she was admitted to a London hospital for metrorrhagia and curetting (following a miscarriage), and the house-physician reported that she showed no signs of pulmonary or nasal trouble and was discharged cured.

3. Mrs. N., æt. 33. *Pulmonary signs*: Impaired resonance at both apices, with prolonged expiration over the right upper, and the apex of the right lowermost lobe. *Symptoms*: Dyspnoea, loss of weight, and cough, dating for six months back. Sputum always negative. She had had for a year left-sided yellow purulent nasal discharge, a great deal of which she must have been inhaling or swallowing, for the pus mostly went backwards, the septum obstructing the passage forwards, being so much deviated towards the affected side that the writer had to resect it before being able to puncture the left antrum (dark to transillumination on both sides). Nothing definite in the washings, but as a precaution the antrum was opened at a special hospital. Eight months after discharge from consumption hospital, cough gone and general health good. Persistence of the nasal discharge, which she syringes out twice or thrice daily, makes frontal or ethmoidal sinusitis likely. For this she has not sought advice.

4. F. A., carter, æt. 16. *Physical signs*: Interrupted inspiration, some loss of resonance, and slightly prolonged expiration at right apex. Sputum repeatedly negative. An eight months' history of cough, loss of flesh, blood-streaked expectoration, and occasional night-sweats. When asked for it, tells

of a bilateral yellowish discharge ever since he can remember. Usual signs of left maxillary sinusitis, with polypi.* Dark on both sides to transillumination; much pus on puncture (left) and lavage. Patient transferred for operation: much pus found in left antrum. Six months later, he is at work with no cough, and only mucoid expectoration.

5. W. H., collier, æt. 16. Cough and blood-streaked spit for the last three weeks; had been in bed a fortnight. No pulmonary physical signs, sputum negative. When asked as to his nasal condition, gave a history of bilateral yellowish discharge for certainly a year; he uses two or three handkerchiefs a day, a large allowance for a collier. The middle turbinates are polypoid, there is left-sided nasal obstruction from deflected septum, and muco-pus in the middle meatus on both sides. Dark bilaterally to transillumination, although sensation of light is preserved. The septum was resected and the patient taught to syringe out his nose with alkaline lotion pending further examination. He did not attend for this, and some months later was found to be at work and well, with only half a drachm daily of expectoration, which was no longer blood-stained.

There can be little doubt that four, at any rate, out of these five cases were of the nature mentioned above. They suffered not from a tuberculous, but from a purulent invasion of the lung,[†] with toxic symptoms; and nasal treatment, not so much radical as consisting in regular removal of the discharge, was of first importance—indeed, a therapeutic *sine qua non*. The absence of a voluntary history of nasal symptoms is a characteristic of these cases to be borne in mind. It will be noticed that the anterior group of nasal sinuses is affected in four out of the five.

In the three following cases, all of the posterior group, some uncertainty must remain as to whether the pulmonary disease was tuberculous or septic; possibly it was both.

1. L. B., factory girl, æt. 26. *Pulmonary signs*: Loss of resonance over right clavicle and above and below the corresponding scapular spine. Inspiratory murmur harsh over right supra-spinous fossa. The first chest symptom was cough, beginning four months previously, followed by loss of weight, shortness of breath, and some indigestion. Very slight pyrexia; sputum constantly

* One recalls the infrequency of these in true consumption, mentioned in Chapter IV.

† It is perhaps more than a coincidence that prolonged expiration was heard so frequently, for, of course, Turban mentions this pulmonary physical sign as indicative of fibrosis, a change likely to be produced by prolonged septic infection. Otherwise there seems nothing specially characteristic about the results of examination of the lungs.

negative; a brother had died of consumption. Questioned as to nasal condition, she said that two years ago she had noticed "catarrh," i.e. discharge dropping from the back of the nose into the throat. She had been to a provincial infirmary for this, and had some endonasal operation under local anaesthesia. On rhinoscopy the septum was slightly deviated to the left, and in the right nasal fossa there was pus on the floor of the nose, as also high up on the septum posteriorly. Both turbinates much atrophied. The writer packed the nose with cocaine and adrenalin, and after removing a little of the middle turbinate with a ring knife, could get a probe into the sphenoidal sinus and demonstrate it as the source of the pus. Unfortunately, this case was first seen shortly before her discharge from the institution where she was, and afterwards was lost sight of.

2. M. T., housewife, æt. 25. Pulmonary *physical signs* were dulness, harsh inspiration, and prolonged interrupted expiration over the left upper lobe. *Symptoms:* Cough for a year; spit sometimes bloodstained, and once she brought up nearly a pint of blood. There was a history of tubercle bacilli having been found, but the writer could never find them. Heavy night sweats formerly, and a loss of weight of over a stone. The nasal history was of symptoms, for more than a year, of post-nasal catarrh, for which she had elsewhere been given a nasal douche. On inspection there was no intra-nasal atrophy, but pus in both olfactory clefts, whilst post-rhinoscopically there was pus seen above the middle turbinate on both sides, and on the right some turgescence of the mucosa, the right choana appearing smaller than the left one. Clear on both sides to transillumination. The nasal secretion (it contained no tubercle bacilli) re-accumulated very soon after syringing, which procedure relieved, however, her headache. The general condition improved under sanatorium treatment, although there was slight continuous pyrexia (99°-99.8°) and some nasal obstruction. A year after discharge from the sanatorium she was *in statu quo* in all respects.

3. A. V. G., gunsmith, æt. 34. *Physical signs:* Diminished resonance both apices in front and roughened inspiration at the right one. A trace of sputum, with no tubercle bacilli present. *Symptoms:* began six months previously with cough; eight weeks before he had spat up 3 ounces of blood. Slight loss of weight, soon regained, and very little loss of work. Three years previously he had had "pneumonia." The nasal history was of a discharge from the nose since childhood; at the age of sixteen he sought medical advice for a discharge of bad-smelling crusts from the nose.

On nasal examination pus was seen in both olfactory clefts, and from behind also above the middle turbinates. There was great atrophy, so that on the right side the ostium of the sphenoidal sinus could be seen and a probe passed in. On transillumination, dark on the right side. The case was clearly one of ozaena originating in purulent rhinitis in childhood, complicated by sphenoidal and posterior ethmoidal sinusitis, and perhaps aggravated by the metallic dust particles encountered in his trade. The patient was taught to syringe his nose properly, which relieved him so much that he declined operation. General condition very good. Two years later he was keeping well and at regular work.

We have given then, above, five, or at any rate four, instances of 'false phthisis,' septic in nature and not tuberculous, due merely to constant inhalation of pus; and

also three of doubtful, perhaps of double, nature, where neither the tuberculous nor the septic factor could be quite excluded from the etiology of the pulmonary affection. Thus cases of pus inhalation mimicking consumption, which we might call du Magny's disease, are commoner than cases of dust inhalation also causing confusion with phthisis by giving rise to Krönig's apical collapse-induration. Rhinological treatment is, of course, essential in both.

What comes next, the ground having been thus cleared, is to consider the nasal sinusitis found in the material proper of this Study, namely, the 500 consumptives and the 452 controls already repeatedly mentioned.

As regards these 500 consumptives, there can, of course, be no doubt as to the nature of the pulmonary disease, which, from the presence of tubercle bacilli in their expectoration, was certainly tuberculous. But unfortunately one cannot be as precise over the localization, or even the existence, of the nasal ailment provisionally diagnosed in them. For the presence of severe or active consumption contra-indicates the surgical measures—for instance, a general anaesthetic and removal of a middle turbinate—often necessary to establish such a diagnosis, when simple means like collunaria will do all that is immediately necessary in the way of treatment. The same disability, too, obviously applies in the case of a healthy person coming forward as a 'control' examinee. Nor does any literature of the subject help one much out of the difficulty. Whoever has read through the individual notes on post-mortem examinations of the accessory nasal sinuses must have noticed how the nature of the malady the subject died from (for example, the acute exanthemata), and how *ante-mortem* and agonal changes alter the appearance and contents of these cavities, vitiating any workable conclusion as to the frequency of nasal sinusitis in patients suffering from this or that disease. The conclusions of the authors themselves as to their puzzling material do not give a very positive result. Killian, E. Fraenkel, and

Wertheim thought nasal sinusitis unduly frequent in the phthisical, but if one puts together the figures left by Harke (*loc. cit.*), Fraenkel (110), Lapalle (111), Wertheim (*loc. cit.*), Minder (*loc. cit.*), and Schönemann (*loc. cit.*), the phthisical subjects only show a preponderance in sinus abnormality over the non-tuberculous if from the latter are excluded those who died of acute infectious disease. However, these authors are helpful in establishing that the sinusitis found was itself non-tuberculous. This is the more likely because, firstly, tuberculous disease of the nasal accessory sinuses is a great rarity, and secondly, when it does occur it is mostly an oral infection of the maxillary antrum, which cannot be said to be the case with the nasal sinusitis to be found in phthisical subjects.

Coming to literature on nasal sinusitis found in living consumptives, we have first Liaras' record (*loc. cit.*). He adds the note 'probable sinusitis' to 3 (all males) out of his 75 consumptives; in 2 the sinus affected was the maxillary antrum, in the third no localization was made. Freudenthal puts "? Empyem" to the notes of the nasal condition of one of his patients, likewise a male. Alexander only examined four of his cases for nasal sinusitis, finding them negative. He thought it likely that this condition existed to some extent in the rest. Moeller and Rappoport record "bilateral disease of accessory sinuses" in one of their female subjects. Ducos noted 4 cases of sinusitis in his consumptives, but only described one of them. This was in a male, and is put down as probably of the maxillary antrum. In his 100 controls there was 1, likewise probable maxillary sinusitis, but in a woman. There are then two stray observations chronicled in Chapter II. Noebel and Lohnberg, describing a family affected with ozæna and sinusitis, mentioned that the mother had phthisis so advanced as to preclude nasal operation; Siebenmann, that ozæna plus sinusitis was mostly found in tuberculous subjects.

110. E. Fraenkel: *Virchow's Archiv*, 1896, Bd. 143.

111. Lapalle: *Archives internationales de Laryngologie, d'Otolie, et de Rhinologie*, May-June 1899, No. 3.

Skillern (112) punctured the maxillary antrum in 100 tuberculous individuals, finding secretion or pus in the washings in 11 of them. He contrasts this proportion with the considerably higher ones found post mortem, and makes the failing ciliary activity during the last few days of life responsible for the difference. Tuberculosis, he concludes, does not predispose to sinusitis more than other diseases do. One might remark, however, that 11 per cent. is still a high proportion. Lastly, D. McKenzie attributed purulent ethmoiditis to 10 out of 102 out-patients at a consumption hospital.

In our present material, the probable cases of nasal sinusitis numbered 7 in the consumptive group (1·4 per cent.), 6 men and 1 woman, as against 4, who were all men, in the controls (0·8 per cent.). Thus, clinically, nasal sinusitis (non-tuberculous nasal sinusitis, of course), is commoner in consumptive than in non-tuberculous individuals, a result to be expected in view of the similar preponderance in consumptives of non-tuberculous nasal defect generally, which is allowed to contribute in some measure to sinusitis. The cases in the consumptive group are appended:—

1. M. T., æt. 28. Turban Stage II. Had had scraping of secretion from the back of the nose for a year or so. There was septal deviation blocking the left nasal passage, and a small polypus at the hinder part of the right middle turbinate. The post-nasal space was full of muco-pus. After syringing, pus re-accumulated quickly, coming from under the middle turbinate and more on the right side. On transillumination, dark on the right side; punctured twice, nil in washings. The septum was resected and polypus removed. Persistence of discharge makes likely empyema of frontal sinus or of anterior ethmoidal cells.

2. G. W. C., æt. 29, grocer. Turban Stage I. Had had nasal discharge, mostly from the front and on left side, for about two years. Left middle turbinate enlarged; muco-pus seen in the middle meatus on both sides—putting the head down increased it slightly on the left side. Transillumination, dark left; sensation of light neither side. On puncture, pus left. Sent out for operation: both antra opened and osteitis of ethmoidal cells also curetted. Patient did well.

3. J. R. S., farmer, æt. 27. Turban Stage II. For two years had noticed

112. Skillern: *Journal of American Medical Association*, 21 September 1912.
Analysis in *Centralblatt f. d. g. Tuberkulose-Forschung*, December 1913, S. 98.

occasional greenish discharge from the left nostril, which smelt badly to himself. Septum deviated to right with dislocated septal cartilage, producing right-sided obstruction. A little dried secretion on left inferior turbinate and some muco-pus on roof of naso-pharynx. To transillumination the right side clearer than the left, and sensation of light on the right side only. Left antrum punctured; washings not clear. The sinusitis seemed, however, quite quiescent, and operation was further totally contra-indicated by the fact that this patient also had diabetes mellitus, from which, and the lung affection, he died a year later.

4. A. P., commercial traveller, æt. 21. Turban Stage III. Greenish nasal discharge, beginning on the left side, and mostly from the back of the nose, for two years. Subjective foetor at first. Left middle turbinate enlarged and polypoid; pus seen in left olfactory cleft, on floor of right nasal fossa, and in front of left Eustachian orifice behind. It re-collected soon after syringing. Transillumination dark left, sensation of light neither side. Left antrum punctured and washed out with negative result. Probable empyema of posterior group of sinuses, mostly on left side.

5. J. G. S., butcher, æt. 30. Turban Stage II, with some chronic bronchitis and emphysema. Subject to colds in the head, and for some years has lost the sense of smell. The right middle turbinate showed slight 'cleavage,' and there was nasal obstruction and a good deal of muco-pus in the right inferior meatus. Dark both sides to transillumination, and much pus on puncture of right antrum; serous fluid in left one. Patient sent out for operation: antra opened and middle turbinates removed, ethmoidal osteitis curetted. Returned to sanatorium and at first did well, but before long signs and symptoms of bronchitis increased, and he died five weeks after the operation.

6. W. H. C., collier, æt. 45. Turban Stage III, with severe laryngeal tuberculosis, and later dysphagia, for which the writer had to perform epiglottidectomy. The nasal symptoms were, for the eight or nine years previous, periodic 'cold in the head,' accompanied by pain at the external angle of the orbit. This was then always followed by discharge of bad-smelling pus from the right side of the nose, which relieved the pain. Posterior wall of pharynx seen from the front on both sides, and both middle turbinates enlarged; no pus visible. Probable right frontal sinusitis.

7. S. J. Y., housewife, æt. 24. Turban Stage II. Had had bad smelling crusts and discharge from the left side of the nose for the last eight years. Both sides of nose atrophic, especially the left. Pus visible in left sphenoidal cleft, which soon re-accumulated after syringing. Removal of the pus obviated the foetor. Possible left-sided sphenoidal or posterior ethmoidal sinusitis.

Here, then, are five probable cases of empyema of the anterior group of nasal accessory sinuses to two probable ones of the posterior group. In the couple of cases operated on, the maxillary antrum was seen to be rather a reservoir than a primary source of purulent secretion; the ethmoidal caries found was perhaps due to anterior ethmoidal disease (in which case the absence of polypi was

rather remarkable), and recalls von Rimscha's cases (*loc. cit.*, Chapter I) of 'non-tuberculous intra-nasal caries,' some of which had pulmonary phthisis. There was one death, probably contributed to by the operation, so it would seem that sinus suppuration in a sputum-positive consumptive is hardly ever worth operating on, unless some serious complication on the nasal side (such as an ocular one) is present. Such I have never seen, although of course there is nothing to prevent it occurring. The staple of treatment is to keep the nose clean with syringing, and thus prevent decomposition of the pus or its being inhaled and swallowed. Amongst the control of non-tuberculous persons there were, as stated, four cases of probable sinusitis. Three were of the anterior and one of the posterior group of sinuses, polypi being present in two of the former. Clinically, then, nasal sinusitis is probably commoner in pulmonary tuberculosis than it is amongst the general population, perhaps nearly twice as common. The disproportion in the case of patients at tuberculosis institutions is a little greater, because some patients with merely septic infection of the lungs are mistaken for consumptives.

* * * * *

This chapter will be concluded with mention of a matter deferred for consideration from Part I of this essay; that is, the nasal condition of ichthyotic and squinting tuberculous patients. We saw there that ichthyotics are especially liable to tuberculosis, and noticed in 3 of the 23 cases adduced that rhinitis sicca existed, or a dry, sometimes cracked, condition of the Schneiderian membrane presenting superficial resemblance to the dry, cracked condition of the skin characteristic of ichthyosis. It was conjectured that as there existed a strong case for nasal defect being a predisposing cause of tuberculosis, some part, at least, of the tuberculous tendency of ichthyotics might reside in their associated nasal defect, be that dry rhinitis or other nasal abnormality.

The nasal condition of the 23 ichthyotic consumptive patients (see Part I) was as follows:—

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- Case I. Nasal mucosa dry on both sides of the nose.
- Case II. Rhinitis sicca well marked ; a history of crusting and epistaxis.
- Case III. Septal spur on left side touching the inferior turbinal and producing obstruction (spur removed).
- Case IV. Slight septal irregularity, but nothing definitely abnormal.
- Case V. Vertically placed nostrils ; dislocated septal cartilage ; naso-pharynx seen from the front on left side ; slight adenoids. A history of mouth-breathing and of nasal crusting.
- Case VI. Normal.
- Case VII. Protrusion of superior incisors ; rhinitis sicca anterior ; a history of epistaxis.
- Case VIII. Normal.
- Case IX. Syphilitic perforation of the septum—a history of mouth-breathing.
- Case X. Normal.
- Case XI. Posterior naso-pharyngeal wall seen on both sides on anterior rhinoscopy.
- Case XII. Protrusion of superior incisors. Deviated septum.
- Case XIII. Posterior naso-pharyngeal wall visible on right side.
- Case XIV. Nil objective ; a history of epistaxis and slight nasal obstruction.
- Case XV. Adenoids and enlarged inferior turbinates (adenoids removed ; anterior turbinectomy performed).
- Case XVI. Posterior naso-pharyngeal wall seen bilaterally. Crusting and blood-stained cracks of nasal mucosa. History of epistaxis and nasal crusting.
- Case XVII. Not examined.
- Case XVIII. Large septal spur touching the inferior turbinate. A history of epistaxis.
- Case XIX. Nil objective ; a history of yellow nasal discharge, stuffiness, and subjective feter for nearly a year.
- Case XX. Not examined.
- Case XXI. Rhinitis sicca ; for the previous eight years subject to epistaxis ; for the previous two subject to nasal crusting. This patient's ichthyotic-consumptive younger brother had dislocated septal cartilage to the right producing obstruction, a spur to the left touching the inferior turbinate, projection of the superior incisors, and "open bite."
- Case XXII. Posterior naso-pharyngeal wall seen bilaterally ; occasional epistaxis from wt. 22, to wt. 26.
- Case XXIII. A mouth-breather ; post. naso-phar. wall seen left.

Out of the 22 cases examined, 14 or 15 are definitely abnormal ; in 2 operative nasal treatment was carried out despite the presence of phthisis. In tuberculous ichthyotics, then, non-tuberculous nasal defect is much commoner than it is in the general population, where, according to our control aforementioned, it occurs in only about 36 per cent. Reverting to former arguments, we infer that the reason ichthyosis is a mark of liability to tuberculosis is

frequently, not always,* because ichthyosis is accompanied by (among other physical defects) defect of the nasal apparatus. Perhaps, coming to particular forms of nasal defect, dry rhinitis, of which there were 3 instances among the 22 cases examined, is more frequent in ichthyotic consumptives than in non-ichthyotic ones: one speaks guardedly owing to the paucity, almost necessarily a paucity, of ichthyotic consumptives encountered. Dry rhinitis certainly seemed more frequent in them than in consumptives generally. And here one might notice an idea put forward by Sticker (*loc. cit.*) and endorsed to some extent by Freudenthal (*loc. cit.*) and Blumenfeld (*loc. cit.*), as to a supposititious *Xerosis* or *Xerasia* in consumptives, i.e. a general tendency to dryness of the whole upper respiratory tract. One would rather say that nasal dryness and atrophy came first, and that the insufficiently moistened inspired air then produced dryness of the deeper lying parts of the upper respiratory tract over which it passed, a pathological process familiar enough to rhinologists. Indeed, Sticker mentions the dry atrophic process he describes as often beginning in the nose. Blumenfeld says that diabetic consumptives show dry rhinitis with especial frequency, but the writer has not found this. Of the 500 consumptives 3 had diabetes mellitus, but none of these three had either rhinitis sicca or intra-nasal atrophy. One would freely admit, however, that there may be individual differences in potency as regards the physiological nasal function of moistening the inspired air. Certainly there are individual differences in the amount of the tissue chiefly concerned with this function which can be removed without subjecting the patient to 'the horrors of a dry nose.' In severe cases of hypersecretion and hypertrophic rhinitis Lack points out that double total inferior turbinectomy can be done quite safely, a procedure upon which, in many subjects, the aforesaid horrors would ensue

* Not always, because ichthyosis is still commoner in, at any rate, consumptives than in the general population, even when ichthyotics with nasal defect are excluded from the reckoning.

quickly. It may be, then, persons with a natural tendency to *hypo-secretion* who tend to get dry rhinitis and simple atrophy under the influence of that continued breathing of heated dusty indoor air which Freudenthal well signalizes as a source of nasal insufficiency, and thereby of pulmonary tubercle. For completeness' sake, such individual idiosyncrasy might be added to the modes of origin of endonasal atrophy and dryness already given in last chapter.

The nasal condition of the 13 *squinters* was as follows :—

Convergent Strabismus.

- I. (W. A. I.). Normal.
- II. (L. C.). Normal.
- III. (T. C.). Posterior naso-pharyngeal wall seen bilaterally.
- IV. (W. Y). Posterior naso-pharyngeal wall seen unilaterally; dryness of that side.
- V. (N. C.). Normal.
- VI. (T. H.). Normal.
- VII. (R. R.). Normal.
- VIII. (E. L.). Posterior naso-pharyngeal wall seen unilaterally.
- IX. (H. T.). Adenoids.

Divergent Strabismus.

- I. (C. A. A.). Dislocated septal cartilage.
 - II. (T. S.). Normal.
 - III. (E. D.). Obstruction from deviated septum; history of post-nasal catarrh for 4 or 5 years.
 - IV. (F. F.). Projection of superior incisors; nostrils slightly vertical—posterior naso-pharyngeal wall seen bilaterally.
- In two further phthisical squinters, as mentioned already on p. 47, the nasal condition was normal.

One can conclude very little here owing to the exiguity of the material. As far as it goes, however, it does not suggest any special association of nasal defect with squint, in phthisical subjects. The tuberculous vulnerability-producing factor may reside elsewhere.

CHAPTER VII

CONSUMPTIVES WITH NORMAL NASAL CONDITION

IN this group were included, besides absolutely normal cases, ones with minimal nasal changes such as seemed likely to produce no pathological effect. The *frequency* was :—

| With Normal Nasal Condition. | | | |
|------------------------------|-----|-----|----------------|
| Consumptives— | | | |
| Male .. | 359 | 117 | (32 per cent.) |
| Female .. | 141 | 39 | (27 , ,) |
| Total .. | 500 | 156 | (31 , ,) |
| Control— | | | |
| Male .. | 321 | 205 | (63 , ,) |
| Female .. | 131 | 81 | (61 , ,) |
| Total .. | 452 | 286 | (63 , ,) |

This is the obverse of the comparisons made in the three preceding chapters. Nasal abnormalities of various kinds were, as we saw there, commoner in the consumptive contingent. A normal nasal condition is correspondingly commoner—roughly, about twice as common—in the non-tuberculous one.

There is, however, no special sex-incidence to be observed. Nasal obstruction, whether of tuberculous or of non-tuberculous subjects, was distinctly more frequent in males. Bilateral endonasal atrophy, alike in consumptives and in controls, was very much more frequent in females. But consumptives with normal nasal condition, and non-tuberculous persons with normal nasal condition, are disposed very evenly among the two sexes.

This finding, then, of equality of sex-incidence when the nasal condition is normal seems to confirm the two nasal abnormalities above mentioned as causal factors in the production of the uneven sex-incidences described respectively in association with them.

Nasal condition apart, this group cannot be said to differ significantly from other consumptives. It is, of course, of interest to examine these nasally normal consumptives and compare them with the rhino-pathological ones, to see if non-tuberculous nasal abnormality has any influence upon the tuberculous lung condition. However, there are of course other factors present, even other predispositional factors; and the disease once started in the lungs may by its progress efface all traces of its slightly varying origin, as, for instance, the inhalatory and lympho-hæmic routes of invasion in nasal atrophy, as against the partly enterogenous one possible in presence of mouth-breathing. The average age of these consumptives was about the same as that of the others, and so was the degree of pulmonary disease. Complications like pleurisy and haemoptysis occur fairly evenly here and elsewhere. The course of the consumption was not noticeably more favourable than in the rhino-pathological patients; indeed, the only remark one would care to make on this point is that, on the whole, experience seems to confirm Chauveau's statement that the consumption of patients with actual ozæna is of a chronic type. It is sometimes accompanied by but few physical signs; more often fibroid, with prolonged expiration audible, and causing shortness of breath. To attribute this, however, to extension *per contiguitatem* of the atrophic, sclerotic process from the nose to the lungs is plainly absurd. The fact of its insidious, chronic course may account for its being often overlooked and unmentioned, and thus for the at first surprisingly high totals of phthisis in ozænatous subjects which have been mentioned. *Tuberculous laryngitis* shows no less in the nasally normal consumptives than in the rhino-pathological ones, a rather surprising result, and one which speaks against chronic catarrhal laryngitis as a predisposant to tuberculous infection of the larynx. The percentages are:

| | Normal Nasal. | Rhino-pathological. |
|----------------------------------------|---------------|---------------------|
| Males with tuberculous laryngitis .. | 5 | 7 |
| Females with tuberculous laryngitis .. | 12 | 7 |

These nasally normal consumptives comprised, too, proportionately just as many men of robust physique (soldiers, sailors, policemen) as did the others.

Concerning the complex matter of a family history of tuberculosis, our material is not quite large enough to warrant inferences.

* * * *

It will be convenient now to append a full list of the chief differences nasal examination reveals between the consumptive and the control subjects, as being useful for reference in connexion with Part IV (Conclusions) of this essay. The figures stand for percentages:—

| LESION. | MALE. | | FEMALE. | |
|--------------------------------------------------------|---------------|----------|---------------|----------|
| | Consump-tive. | Control. | Consump-tive. | Control. |
| Deviated septum | 30 | 24* | 18 | 9 |
| Dislocated septal cartilage .. | 14 | 7 | 8 | 2 |
| Septal spurs and ridges .. | 11 | 3 | 5 | 5† |
| Enlarged inferior turbinals .. | 8 | 6 | 9 | 3 |
| Posterior naso-pharyngeal wall seen bilaterally | 8 | 1 | 31 | 12 |
| Posterior naso-pharyngeal wall seen unilaterally | 18 | 7 | 17 | 12 |
| Projection of superior incisors .. | 6 | 3 | 17 | 3 |
| Vertically placed nostrils | 2 | 0·9 | 7 | 1·5 |
| History of epistaxis | 13 | 7 | 12 | 9 |
| History of trauma to nose .. | 3 | 1 | 0·7 | 0 |
| History of getting crusts from nose | 6 | 2 | 10 | 0·7 |
| History of previous nasal treatment | 3 | 1 | 4 | 0·7 |

* As we saw under *obstruction* (Chapter IV), deviated septum marked enough to produce nasal obstruction is present in 23 per cent. of male consumptives (86 cases) as against 15 per cent. of male controls (50 cases).

† Similarly we saw that nasal obstruction from septal spurs or ridges was, however, nearly twice as common in consumptive as in non-tuberculous women. See Chapter IV.

CHAPTER VIII

INDIRECT EVIDENCE

THERE is, of course, a strong *a priori* case that nasal defect and nasal insufficiency should predispose to tuberculosis.

The physiology of nasal respiration bears strong witness to the action of the nasal apparatus in preparing air for entry into the deeper-lying parts of the respiratory tract. The work of Aschenbrandt, of Mackenzie, Kayser, and Bloch has long established the fact that nasal respiration is an act which warms, moistens, and filters the inspired air. For instance, Kayser (113), in his conclusions, recalls that formerly the function of warming and moistening inspired air was supposed to be carried out in the lung itself. He agrees with Aschenbrandt that this is not so, but that the process named is performed by the suprapulmonary inspiratory passage; and five-sixths of it, indeed, by the part of this tract which is situated above the larynx. Air drawn through the nose becomes about $\frac{1}{2}^{\circ}$ Centigrade warmer, and correspondingly more highly charged with aqueous vapour, than when inhaled by the half-open mouth. This difference *per se* is certainly small, and indeed trifling in view of the great seasonal variations in atmospheric temperature. However, we know from experience that continuous mouth-breathing, particularly during sleep, has unpleasant consequences, due to drying of the mucous membranes. The nose is and remains the organ of respiration, and the primary inspiratory channel.* Its narrow

113. Kayser: *Pflüger's Archiv f. d. g. Physiologie*, 1887, Bd. 41.

* There is additional evidence of this from the physiological accessory movements of respiration, which are constant in rabbits, and may be seen in som

and nearly uniform lumen; the vascularity and richness in glands of its mucous membrane; the fact that these glands furnish uninterruptedly day and night a watery secretion—these characteristics give the nose, even leaving out of count its relation to the sense of smell, the preference as an inspiratory channel over the mouth. The latter cavity is poor in glands of the variety described, and even these furnish a secretion slimy and of relatively low watery content, and also of limited supply, for the oral secretion is nearly abolished during sleep, a fact which accounts for the morning dry mouth of the nocturnal mouth-breather. There is then a further advantage of nasal respiration in that a greater resistance is encountered than in ordinary mouth-breathing, leading to greater activity of the respiratory muscles with consequent full development of them. Voltolini found that in maximum expiration through the nose the air pressure amounted to 240 mm. of mercury, whereas in maximum expiration through the ordinarily opened mouth it was only 160 mm. Likewise the negative inspiratory pressure was greater in nasal than in oral respiration. It should be remembered, however, that the degree to which the mouth is opened may affect these results. Lastly, nasal respiration may have a significance in relation to reflex nervous influences.

This increase of respiratory pressure in nasal breathing has received some attention since the date of Kayser's work, and its physiological influence upon the circulation has been alluded to, as by Schütter. Some Italian observations upon a human subject with tracheal fistula gave pneumographic tracings which had a greater amplitude in nasal than in oral breathing. Hofbauer (114), in some physiological work, has reproduced pneumographic curves showing that the movements of the upper part of the thorax in particular have much less amplitude in mouth human subjects (the laryngeal variety in 16 per cent., according to Semon). These accessory respiratory movements occur in the nostrils and larynx, never in the mouth. See *Luciani's Human Physiology*, English translation, 1911, vol. i. p. 421.

114. Hofbauer: *Pflüger's Archiv f. d. g. Physiologie*, Bd. 147, H. 6, S. 271.

than in nose breathing; he concludes that the mouth-breathers use the upper thoracic segment less. This finding, we may note, rather goes to confirm the well-known claim of Freund and Hart, that consumption more commonly develops in persons with stenosis of the upper thoracic aperture. For chronically lessened functioning should lead to defective development; and thence, perhaps, to rigidity and premature ossification of the cartilage of the first rib. Even failing this, it has an obvious bearing upon deficient ventilation of the pulmonary apices, a condition favourable to their invasion by tuberculosis.

In artificial pneumothorax work, in which one is constantly measuring the force of respiratory movements by means of a needle in the pleural space connected with a water manometer, I have tried a comparison of nasal with oral respiration. So far, however, no significant difference between the two has been observed.

But on the whole one concludes, then, that although, as Kayser notes, the width to which the mouth is opened, the use of the cheek muscles, and so forth, may in mouth-breathing affect the respiratory air pressure, yet in every-day life that pressure is higher in normal nasal breathing than in habitual mouth-breathers. The reason is probably that in nasal breathing both inspiration and expiration take more time than in ordinary oral respiration, the air entering and leaving the system through a narrower aperture.

The *anatomy* of the nasal passages is likewise of significance as pointing to their design as a true respiratory organ. Of this design the first detail does not seem to have been mentioned before, namely, that there are two nostrils. But it is surely important, it must surely be of advantage in the preparation and modification of the inspired air, that that is at once split up into two volumes, instead of being received into the system *en bloc*, as happens in mouth-breathing. Then the vibrissæ act as an initial coarse filter, straining off the largest impurities. Next, the air enters the precincts of the body upwards, and thus in the

opposite direction to that in which it comes to the lungs. Inside the nose the upward aerial current is rounded off, and then altogether reversed downwards by the roof and posterior wall of the naso-pharynx. These changes of direction give increased opportunity of contact of the inspired air with the walls of its chamber, the area of which is great owing to their diverticulated and convoluted form. If lycopodium powder be inhaled through a normal nose, it can be seen, as Parker and others have shown, to be left on the septum in a fan-shaped deposit, and in the naso-pharynx, if indeed it gets as far as the naso-pharynx ; at all events it does not penetrate beyond. Again, the nasal chambers are richly furnished with acinous glands, which secrete continuously an almost purely watery secretion. The secretion flows downwards, taking impurities with it, and passes out of the body. Now, all the above anatomical advantages, which recall closely the purifying mechanism sometimes installed at the intake of systems of artificial ventilation, are lost in mouth-breathing, and many of them seriously impaired in presence of intra-nasal atrophy. In mouth-breathing, except in men with heavy moustaches,* there is nothing answering to vibrissæ. The air enters the body in one volume, instead of divided, and enters also horizontally, instead of upwards ; there is much less change of direction ere it gains the lungs. The walls of its transmitting chamber are not irregular in shape. It encounters no purifying watery secretion, for the smaller glands of the oral cavity are muciparous—as, too, are those of the trachea—whilst the parotid, which yields watery saliva, does not in man, as in the herbivora, secrete continuously. In chronic mouth-breathing, aerial dust reaches at least to the larynx, for it may be seen there. Such impurities as are retained by the secretions of the mouth remain in the body instead of being removed from it. Again, in intra-nasal atrophy there is often a vertical placing of the nostrils, which lessens to some extent the change of nasal direction above mentioned ; the nasal cavities are wider, involving

* I have known workers in dusty trades to cultivate these as a respirator.

a correspondingly lower air pressure of the inspiratory draught inhaled through them; and, most important, the nasal secretion is deficient or absent.

When we inquire as to the *bacteriology* of nasal respiration we encounter, as are not infrequent in this field, some discordant results. The conclusions of Wurtz and Leroyez, of their pupil Piaget, and of St. Clair Thomson and Hewlett, that the deeper parts of normal nasal cavities were mostly sterile, have been contradicted by some other workers. The conclusion, too, that the secretion of the Schneiderian membrane has a special anti-bacterial property—attributed by various workers to bactericidal power, to ferment action, and to stimulating action upon phagocytosis—has not been fully sustained. At all events, in the list of micro-organisms against which the nasal secretion has been described as powerless, is one of most interest in the present connexion, namely *B. tuberculosis*. These facts dispense one from the necessity of noticing in detail the careful bacteriological work done on this subject. But two conclusions from it are not in dispute; firstly, the bacterial content of the deeper parts of the nasal chambers is much less than that of their periphery; secondly, normal nasal secretion is anything but a good culture medium for micro-organisms in general: of the truth of which latter conclusion, although assailed just lately, there is evidence other than experimental in the peculiarly mild character of nasal diphtheria, and in the rarity of intra-nasal tuberculosis. To these two conclusions it might be added that no contradiction exists of Thomson and Hewlett's finding that the tracheal mucus of newly killed animals is sterile.

Needless to say, the bacterial content of a normal nose is by all estimates infinitely smaller than that of the mouth, which is often called the most septic cavity in the whole body. Needless to say, too, that the bacterial flora of an ozænaceous nose (or, as Moeller and Rappoport showed, of a nose affected by endonasal atrophy) is much more luxuriant than that of a normal one.

In sum, then, mouth-breathing and the qualitative im-

pairment of nasal respiration produced by atrophic and other abnormal nasal conditions (even seemingly trifling ones) are calculated, seeing the great frequency of the act of respiration, to favour infection of the system with aerogenous micro-organisms, including the bacillus of Koch. And the atrophic dry nose is also predisposed to intra-nasal tuberculosis, of which there may be additional evidence in the favourite site of that affection, which is the lower part of the front of the septum, that part of the nasal interior most likely to become dry.

It was reflection on these points, no doubt, that made Koch (115) make the following admission, which his pupil Cornet endorsed in a very practical way by taking care to breathe only through the nose when engaged in experimental aerogenous tuberculous infection of animals :—

Wenn die Tuberkel-Bacillen in Staubformen inhalirt werden, dann können sie ebenso, wie es mit anderen inhalirten Staubtheilchen der Fall ist, entweder schon in den oberen Luftwegen hängen bleiben oder bis in die Alveolen dringen. Die Tiefe, bis zu welcher sie in den Respirationstractus eindringen, wird wesentlich von der Art und Weise der Athmung abhängen. Wenn tief und bei geöffneten Munde geatmet wird, dringen sie am weitesten ein. Die Athmung durch die Nase wird dagegen schon einen gewissen Schutz gegen das Eindringen der Träger des Infektionsstoffes gewähren, da von der Nasenschleimhaut eine beträchtliche Menge Staub aus der Respirationsluft zurückgehalten wird.

Again, it has been seen at the beginning of Chapter IV that a peculiar pulmonary apical atelectasis is occasionally associated with mouth-breathing, and that this is referred to penetration of aerial dust into the apical bronchioles; there is also evidence in favour of this being a pre-tuberculous condition. For which reason and others previously stated, it is certain then that, given the possibility of phthisiogeny by inhalation, mouth-breathing would favour this channel of tuberculous infection.

Two other main channels remain: the intestinal, which had many upholders, and the lymphato-hæmic or lymphato-pulmonary. As for the intestinal, the fact has been already referred to that a mouth-breather's saliva must be contami-

115. R. Koch: *Mittheilungen aus dem Kaiserlichen Gesundheitsamt*, 1883, Bd. II.

nated with the impurities of the air he breathes, and that a good part of these impurities, therefore, ultimately reach his stomach. As for the lymphato-hæmic (the path of infection via the faucial or lingual tonsil, the anterior deep cervical lymphatics, and the blood) and the lymphatic-pulmonary (where infection travels from the tonsil, by lymphatic paths experimentally, at least, not very probable, to the supra-clavicular lymphatic glands or to the deep cervical lymphatics, and then *per contiguitatem* to the pulmonary apex) it is clear that in both mouth-breathing and atrophic nasal defect the inspired air should reach Waldeyer's ring in a more impure state than does air which has traversed normal nasal passages: it is therefore proportionally more capable of infecting these structures with air-borne tubercle bacilli. Mouth-breathing would also tend to dry the surface of the tonsil, and thus render easier its invasion by micro-organisms. On every theory of phthisiogeny, then, by all the main channels of pulmonary tuberculous invasion, mouth-breathing is undeniably a favouring factor; as, too, by all but one of them—the intestinal—is atrophic nasal defect. Indeed, in this latter, even, aerial tubercle bacilli might reach the lower part of the back wall of the pharynx, and thence gain the stomach.

* * * *

So much for the more theoretical considerations bearing on *a priori* likelihood. If we seek for concrete instances, instances occurring in nature, instances other than the results of *ad hoc* experimentation, can such be found?

At the least there are some not uninteresting coincidences.

The first of these concerns Mongolian idiots, who are invariably mouth-breathers, and nearly all die of pulmonary tuberculosis. Idiots in general form nearly as striking an instance. They have a tendency to nasal defect,* and a heavy phthisical morbidity.

* Maurice Craig states (*Psychological Medicine*, 2nd ed., 1912, pp. 343, 344) that the naso-pharyngeal passages of idiots are frequently filled with adenoids, that the palate is usually high, narrow, and V-shaped, and that their mouth is open, with saliva dribbling from it. See also Part IV of these Studies.

Again, mouth-breathing children are acknowledged to suffer unduly from acute infectious disease, especially diphtheria. Besides the general bearing of this phenomenon, that if mouth-breathing predisposes to the exanthemata it may to tubercle, we have to notice that a good deal of (French) work has been done to show that the subjects of tracheotomy later on often die of consumption. One explanation advanced is that the 'terrain' suitable for diphtheria is also suitable for tuberculosis. If so, obviously the common factor of mouth-breathing must come into consideration.

A third and more important coincidence (for it is anything but certain that tracheotomized subjects often die of tubercle) that I would bring forward is the immunity of the *Equidae* from pulmonary tubercle; for the *Equidae* never breathe through the mouth.

In the horse and ass "the nostrils constitute the only channel by which the aerial column can be introduced to the trachea, in consequence of the great development of the soft palate, which is opposed to the entrance of air by the mouth; these orifices are also, for the same reason, relatively larger than in the other domesticated animals, in which the passage of air by the buccal cavity is easily accomplished."* According to F. Smith (116), the only time a horse ever tries to inspire by the mouth is in the last stage of asphyxia.

Just as marked an equine characteristic is freedom from tuberculosis, especially the pulmonary form. Macfadyean has written: "Primary tuberculosis of the lung in the horse is a rarity." Hutyra and Marek (117) quote the following proportions of animals condemned for tuberculosis in the abattoirs of the German Empire in 1906:—

| | | |
|--------------------------------|-------------------------------|------------------------------|
| <i>Cattle</i> , 20·6 per cent. | <i>Swine</i> , 2·8 per cent. | <i>Goats</i> , 0·7 per cent. |
| <i>Sheep</i> , 0·1 per cent. | <i>Horses</i> , 0·1 per cent. | |

* Chauveau and Fleming: *Anatomy of Domesticated Animals*, 1873, p. 441.

116. F. Smith: *Veterinary Physiology*, 4th ed., London, 1912.

117. Hutyra and Marek: *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, translated American edition, London, 1912, vol. i. p. 502.

Now, the low percentage incidence of tuberculosis in the case of sheep is not surprising, in view of their altogether outdoor, natural life, their unstinted feeding, and their not being made to labour. But, as is observed in the article 'Tuberculosis' in the *Encyclopædia Britannica* (1911): "Horses are more confined than cattle in the United Kingdom, yet they are far less affected." Asses, too, have a notoriously hard life, yet a tuberculous ass or mule is so rare that prominent veterinarians may have seen only one case.

It is further significant that "a peculiar feature in connexion with tuberculosis in the horse as compared with the disease in cattle is that the distribution of the lesions points to the intestine as the portal of entry."* When horses get tuberculosis it is from being reared as foals on cow's milk, from being fed on it when sick, perhaps from grazing where the dejecta of tuberculous fowls have been, and the like circumstances. Again, their relative immunity only holds good under ordinary conditions. As Macfadyean showed, they, and asses too, can readily be infected experimentally with tubercle by intravenous injection, and indeed copious pulmonary lesions produced. A specific humoral insusceptibility will therefore not account for all the facts.

The main reason for horses' freedom from pulmonary tubercle seems thus to be narrowed down to some factor present in their natural habit of life, and it is hard to disown the strong suspicion that this factor is absence of mouth-breathing. Not that one would deny weight to the factor of undefined specific immunity already alluded to. For instance, Darwin (118) observed that monkeys breathe through the nose more freely than men do. Yet men are much less liable to tuberculosis. Septal deformity is much rarer in negroes than in white men; but negroes are oftener tuberculous. In both instances, exposure of the species for many generations to tuberculous infection, with resulting

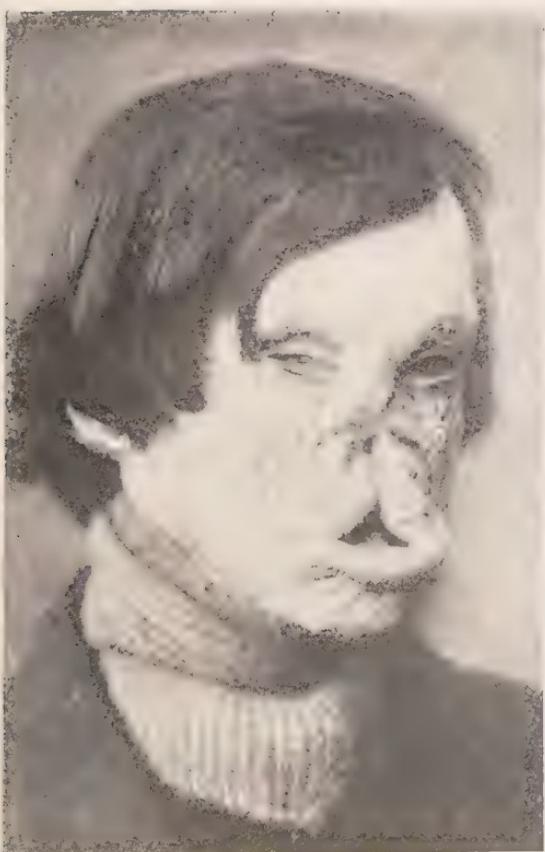
* Hoare: *A System of Veterinary Medicine*, 1913, p. 164.

118. Darwin: *The Expression of the Emotions in Man and Animals*, London, 1904, chap. v, pp. 145, 146.

continuous elimination of vulnerable individuals, confers more protection than does proper nasal respiration. Nevertheless, this highly developed nasal apparatus of the equine species, especially well developed in Arabs and thoroughbreds (which are not, as is the case with highly bred cattle, more liable than other kinds to tuberculosis) and in asses and mules—which are even less susceptible than the horse—this nasal apparatus which can transmit all the air required in the greatest exertions, is, we maintain, when coupled with these animals' freedom from consumption and tuberculosis generally, a considerable argument in favour of the main contention advanced in this essay. Another ground of freedom from tuberculosis, which horses share with sheep, pigs, and probably goats, all of which latter get tuberculosis much less than cattle, is the absence of a besetting habit of cattle of frequently licking out the nostrils, for cleansing purposes. The accumulation of atmospheric impurities at the entrance of the nostrils (and, as we have seen, this is the most septic part of the nasal passages) may not have a harmful bacterial content when the animal leads an out-of-door life (and of course cattle kept out at pasture suffer much less with *perlsucht*), but must, in the case of beasts confined to the byre, contain no few aerial bovine bacilli, which, denied admission to the system by the respiratory route, soon gain it by the alimentary one.

Other two phenomena which one would instance to show *a priori* likelihood that mouth-breathing and nasal defect conduce to tuberculous infection, are the heavy incidence of tuberculosis amongst lepers, and to a less degree amongst aged persons (senile tuberculosis). For lepers often suffer much nasal destruction, and the aged are prone to habitual mouth-breathing.

As can be seen in the photographs, in the nodular form of the disease the respiratory function of the nasal passages must be very much lessened, while in both forms mouth-breathing exists. As for senile subjects, these are subject to a form of mouth-breathing due in part to relaxed muscu-



(A) NODULAR.



(I.) ANESTHETIC.

(From Hansen and Loofts' *Leprosy in its Clinical and Pathological Aspects*
Translation by N. Walker, Bristol, 1895.)

lature of the lower jaw, and thus somewhat akin to the open mouth seen in the dying, and (Darwin) in the expression of astonishment—especially when a toothless condition is present. As Bloch (119) puts it in his well-known book on mouth-breathing :

Da die Lippen nicht mehr den gewohnten Halt an der unbeweglichen Fläche der Zahnreihen besitzen, so werden sie, wenn im Schlafie ihre Musculatur erschlafft, von der ein- und ausströmenden Luft wie Blätter im Winde hin und her bewegt. Der Unterkiefer sinkt herab . . . kurz, wir haben *die senile Form der Mundatmung.*

Again, it has already been seen (Chapter V) how intra-nasal atrophy has a special prevalence amongst workers in dusty trades, and among the subjects of tertiary syphilis, both classes known to show in general a rather heavy morbidity from consumption. On our hypothesis that nasal defect predisposes to tubercle, it might have been expected that these particular persons should become consumptive unduly often. Of course, as with lepers too, there are other factors operative—from the charge of exclusive insistence upon one causal factor the choice of a motto for these Studies should absolve one—factors such as constitutional depression, etc.; but nevertheless the proved association of nasal defect with phthisical predisposition in the classes named does go to show *a priori* likelihood of a causal connexion inhering in the same association in others. Lastly, intra-nasal atrophy means a wide nose, and there is some evidence that even mechanical overwidth of the nasal passages may impair their faculty of air filtration. Saenger (120) said that in workers in dusty trades, those with wide nasal passages showed dust in the respiratory tract as far down as the trachea, which was not the case when the nasal fossæ were of normal size. The former class also suffered more frequently with obstinate bronchial catarrh. Pluder, too (*loc. cit.*), opined that if the inspiratory air stream be the conveyor of infection, then that could be facilitated by a wide nose.

119. Bloch : *Die Pathologie und Therapie der Mundatmung*, Wiesbaden, 1889, S. 55.

120. Saenger : *Centralblatt f. innere Medizin*, 19 March 1898, No. 11.

And lastly, a word as to our method of inquiry, which is of course clinical. Granting the suggestiveness of laboratory investigation, is it not likely that the facts of human infection *in exact actual detail* will be better discoverable by examination of the persons of its ordinary victims than by approximate, artificial 'reconstitution of the crime' through animal experiment?

Concerning indirect evidence and the question of likelihood, then, let so much be said.

PART IV
CONCLUSIONS
AN EXAMINATION OF LUNATICS
PROTOCOL

CONCLUSIONS

To begin with a truism, all conclusions here stated must stand or fall with the work set forth in the two preceding parts of this essay. If that passes muster, then these follow of themselves, and in obvious fashion. There is especial cause for this observation, because the fault, if one may say so, of most writings on the tuberculous diathesis is too much expression of opinion and too little verification; too much *general* theorising, and not enough particularity. The needed contribution to the study of this subject must be one that directly corrects this fault: hence the not unwelcome obligation to be both concise and succinct in drawing deductions from the results communicated above.

The main conclusion can be expressed in three words—
Back to Diathesis!

The idea of intrinsic phthisical predisposition, autochthonous and innate, not merely the result of debilitating agencies, has always had its supporters. In the past, perhaps—especially when, owing to the absence of hygiene, tubercle was rife—in the past the importance of the ‘soil’ factor was rated a little too highly. This is as good as proved by the results and teachings of hygiene and bacteriology: the decrease in the disease was too large and sudden not to be due almost wholly to improvement in nurture rather than in nature. Then, as is usual, opinion swung over too far. In the last decade or two there has become more and more noticeable a conception of phthisiogeny characterized by exclusive practical regard for the factor of

the 'seed,' tempered perhaps with passing mention of a possible personal predisposition; while probably the most fashionable view of all left this latter out of the reckoning altogether. Take, for instance, the following recent summary of his own views made by Chabas (1) of Valencia:—

Il n'existe pas de "causes prédisposantes." Toute cause a son activité : on ne comprend pas une cause qui menace sans agir : la prédisposition est déjà une maladie, degré, période ; le "prédisposé" est déjà un malade, un tuberculeux. Nous sommes tous attaquables par la T. ; les autopsies des vieillards, la cutirréaction, etc., le prouvent ; tout "prédisposé" !

The preliminary assertion is a bold one; namely that (presumably throughout the whole of medicine) there are no predisposing causes, only exciting ones. For this writer miners' phthisis must be a misnomer, because in the worst mine some escape. But the South African discontent would perhaps be aggravated rather than appeased by a pronouncement that consumption had nothing to do with rock-drilling. Asked to explain the fact that, in spite of good conditions of life, 93 per cent. of Mongolian idiots at Earlswood die of tuberculosis, Chabas should argue that it has no significance. For idiocy to be contributory to tubercle, the proportion should be 100 per cent. Similarly the practice of life insurance companies, who penalize the lives of clients of poor height-weight ratio, because rather more of them than of heavier people become tuberculous, seems irrational. Again, the theory of all phthisical traits being due to tuberculo-toxæmia is a matter that has been looked into above, with the result of *reductio ad absurdum*. It is true, of course, that autopsy records of adults dying from non-tuberculous causes show a high percentage (the latest estimates, by the way, reduce the original ones considerably) of healed tuberculous foci. But it is also the case that most persons do not die, or suffer clinically, from tuberculosis. A cretaceous gland or scar somewhere or other in the body—quite symptomless—is a very different

1. Chabas : *Centralblatt f. d. g. Tuberkulose-Forschung*, 31 August 1914, S. 691.

affair to consumption or hip-disease; and pulmonary tuberculosis is thus not identical with consumption, which is why that last word has been used so frequently in this book. To class together the great number who resist tubercle with the small minority who fall ill, or die, of it, is nearly as much the act of a doctrinaire as would be to include in one category the vast majority of the population who get a boil at some time in their life with the few of low resistance who get chronic impetigo or septicæmia.*

And if all are equally predisposed to tuberculosis, how (may one ask) can that be squared with our results; how comes it that the tuberculous contingent shows relatively so much ichthyosis, squints relatively so frequently, has nasal insufficiency so often, and, one would add (for the present list of stigmata is probably far from exhaustive) exhibits relatively so often a slightly bifid uvula, and, perhaps, other ocular anomalies and malformations besides squint?

An analogy will here strengthen our case. One of the triumphs of medical investigation by means of the apparatus of the physical laboratory has been the demonstration of syphilis as the chief cause of general paralysis of the insane. Moved by this, probably few alienists whose experience did not antedate this discovery thought that any intrinsic etiological factor existed, or at least paid no practical attention to such; although a worker like Charcot still believed in the "*paralitico-nato*," regarding syphilis as the fortuitous ex-

* An example of the confusion above described is seen in the claim that any investigation of hereditary or familial liability to tubercle should be based upon records of full post-mortem examination (including, presumably, serial sections and animal inoculation of every organ) of all the individuals concerned. The practical impossibility of carrying out such an inquiry on an extensive enough scale is, however, no argument against its rationality. What condemns it is that the recommended procedure could provide no answer to the question of the existence of special tuberculous predisposition. An ascendant who lived healthy and died of old age, but whose lung showed a small apical scar, would be reckoned tuberculous together with his grandchild who went off in consumption at twenty years old. The principle lost sight of is one surely generally admitted, namely that absolute health is a rarity, and that health and disease nearly everywhere shade off into one another; which again is an application to medicine of the Heraclitean principle of flux.

citing agency. However, lately a leading English mental specialist (E. Goodall) has pointed out the work of Näcke (2), who concludes from certain characteristics (not glaring as in many forms of lunacy, and therefore largely ignored) of the general paralytic—such things as a family history of mental defect, as anomalies of mental development and disposition, as physical stigmata of degeneration, both external and, as in rare variations of the cerebral convolutions, hidden—concludes that the view of Charcot, which some have deemed old-fashioned, was in accordance with the latest evidence :—

Diese Theorie würde nur eine Spezialfall des allgemeinen, wohl zu Recht bestehenden Satzes sein, dass, wie schon Henle annahm, jede Erkrankung endo- und exogen bedingt sei, und die neueren pathologischen Anatomen und inneren Kliniker nehmen immer mehr auf die sog. Konstitution der Kranken Rücksicht.

Such a change, the writer believes, must come over the present conception of tuberculous infection, conformably with the tendency, everywhere visible in science, of further investigation to show further etiological complexity. How then, exactly, in the connexion under notice, may our “newer pathological anatomists and medical clinicians pay more and more regard to the so-called constitution of the patient”?

It is a wide question, and the answer a long one, needing to be divided up under different headings. Probably those long familiar in medical text-books will serve best, but for once in a reverse order. Beginning then with

PROPHYLAXIS,

we enter a large field of practical application. In face of plainly evident *ichthyosis* and *convergent squint*, both of which fortunately appear at an early age, the procedure is obvious. When the child who is the subject of either is brought for medical advice it should be examined—by an

2. Näcke: “Der endogene Faktor in der Pathogenese der Paralyse,” *Zeitschrift f. d. g. Neurologie u. Psychiatrie*, 1913, Bd. 18, H. 3.

expert—for tubercle, and if the result be negative the parents should be warned of the extra risk and told to send it to an open-air school, and, when it is a male, to bring it up to outdoor employment.

In *divergent squint* similar measures must be taken, although as this affection appears later they will necessarily be deferred.

Slighter degrees of xeroderma will not be obvious to the laity. They are therefore unlikely to reach a dermatological clinic, and must be the care of the general practitioner and especially of the school medical officer. Any 'bronchial catarrh' in a subject with rough elbows and knees must excite the strongest suspicions, while the children of all ichthyotic patients are to be carefully supervised.

We might follow out somewhat the same scheme of prophylactic procedure in the case of *nasal defect*. Patients with nasal trouble presenting themselves at the special institution—in this instance the laryngological clinic—should be also examined, again by a practised phthisiologist, for consumption. At present such examination is made only when laryngeal tubercle is suspected. In the event of a negative finding the patient should be warned to use all the familiar hygienic means of guarding against tuberculosis. Throat hospitals* may be expected to receive, in the case of the working class, which is of course numerically, and because tuberculosis affects that class most, far the most important, a trifle over 3 per cent. of all consumption : for we saw in Part III, Chapter VII, that about that proportion of our consumptives gave a history of previous rhinological treatment; at a time when, in most cases, they were free from lung symptoms.

The remaining vast majority, therefore, a majority almost certainly proportionally larger than in the case of ichthyosis, and certainly very much larger than in the case of squint,

* Very possibly some of the decline in tuberculosis in the last thirty years must be put down to the rise of laryngology leading to the establishing of these special institutions, especially through their promotion of the operative treatment of adenoids.

will elude the special clinic. What rhinological prophylactic measures can be applied to this 97 per cent.?

Seemingly the measure most readily applicable is to make use of the public-health organization that already exists for lay anti-tuberculosis education, as, for one instance, by adding to the leaflets, instructions, etc., issued to that end, a plain warning of the possible serious import of nasal symptoms. The public should be told that stuffiness of the nose, nasal injury, chronic nasal discharges, post-nasal catarrh; and, in the case of men, epistaxis; are possible dangers to the chest and therefore things to seek advice for. The place of resort indicated to them must at present be a throat hospital or clinic. In the near future, it is to be hoped, a thorough post-graduate course of laryngology and rhinology will be insisted upon in the case of tuberculosis officers—and, indeed, tuberculosis experience and clinical competence be allowed, as a fact, to influence election to these appointments. Then general practitioners might be asked to send to the tuberculosis dispensary these unfortunately unobtrusive cases of nasal defect. Further, school medical officers might be encouraged to specialize in rhinology, since they have opportunity of examining all children before leaving school at the age of fourteen, when septal deformity and ozæna mostly become evident. The school clinics now beginning to be established might thus come to aid the laryngological clinics and the tuberculosis dispensary in this rather extensive undertaking; for we saw that about one-third of the working-class population has some grade of nasal defect, although, of course, much of it of a kind very simply and quickly treated. As a class, general medical practitioners, particularly 'panel' ones, are too busy to study and carry out special work, while there would be great waste in their each getting £30 worth of instruments in order to treat a few cases only.

The non-tuberculous ichthyotic, or squinting, or nasally insufficient individual should be guarded from intimate contact with tuberculosis. At first sight, it seems a consequence of believing in these forms of predisposition that

one should disbelieve the curiously detailed instances of infection sometimes put forward by the contagionist school and those influenced by it; such as that A, a man of thirty-five, contracted consumption a year ago through a fortnight's visit to his brother who was dying of the disease—when A presents on rhinological examination a left nasal passage sealed by septal deviation which must have existed for nearly twenty years. However, special opportunity of infection probably counts as well as predisposition. Thus, in our ichthyotic case II, the patient's ichthyotic brother was healthy until marrying a woman who soon died of consumption. The squinting consumptive F. F. was likewise healthy until shortly after the death of her husband from consumption with severe laryngeal involvement, for which the writer had to amputate the epiglottis—thus a very infectious case. Other instances could be given. It is true that in both of the above patients the age at onset of the disease was one very usually found in consumption with no such clear history of exposure to infection. Nevertheless, the total impression left on one's mind is that this intimate contact with tuberculosis, while by no means necessary to development of the disease in an ichthyotic, or a squinter, or a person with nasal defect, is all the same peculiarly dangerous to such people. When the contact, as in the above cases, occurs in marriage, it affords an example of the previously undefined, but statistically (K. Pearson) supported, factor of 'assortative mating' in accounting for the occurrence of consumption in both husband and wife; i.e. that a person predisposed to consumption tends a little to mate by preference with another so predisposed. In the first of the above instances selection was quite free: the parties did not meet at an institution for tuberculosis. In the second, consanguinity existed.

Next after prophylaxis in the general population comes prophylaxis, with of course greater initial advantage, in physically selected bodies of men and women, e.g. in connexion with life insurance and with recruiting for public services, staffs of employees, and so forth. Here clear

indications appear in respect of the three anomalies under notice.

Ichthyosis has been shown to be so sparsely distributed (0·2 per cent.) in the general population, that all who are subjects of it may be rejected at once for army, navy, store, bank, post-office, or in fact any occupation that is not of an easy outdoor character. That there would be a real saving in doing this is made likely by the fact that three out of our 23 ichthyotic consumptive cases were soldiers, of whom two were invalidated out of the service for consumption. The amount of 'weighting' in life insurance that ichthyosis requires, as regards tuberculosis alone, is a matter for simple actuarial calculation based upon the fact that it is several times commoner amongst the tuberculous than in the general population ; and the case histories given show that ichthyotics become consumptive at the usual age of onset of that latter disease.

Squint, if only by reason of the nearly always associated defective vision, probably excludes already from most of the physically selected classes. But there is of course an easy application to life-insurance work, in scope not as large as in the case of ichthyosis.

Nasal defect is a much more complicated matter. Its absolute frequency in the tuberculous is much greater than is that of either of the two previous anomalies, but its relative frequency less. They are respectively two and a half, and three, times as common in tuberculous as in normal persons: it is scarcely twice as frequent. More than a third of the general population have, it is probable from our 'control' figures, non-tuberculous nasal defect such as one finds so often in consumptives; which would plainly be an impossibly large proportion to reject in recruiting, or to penalize for life insurance, for one cause alone. Moreover, the anomaly now in question is not so unequivocal as the other two. We therefore seek for those particular forms of it which are *especially* frequent in the consumptive as compared with the non-tuberculous individual ; referring the reader to the table at the beginning

of Chapter IV and to that at the end of Chapter VII, Part III.

We saw there that only 12 per cent. of non-tuberculous women, as against 32 per cent. of consumptive women, showed unilateral or bilateral nasal obstruction. In State or municipal indoor employments open to women (the number of which will of course, owing to the European war, be increased for some time)—those at any rate for which plenty of applicants are forthcoming—it would be worth making it a condition of engagement that candidates suffering from nasal obstruction should first have this condition remedied, all the more because local anaesthesia suffices, and because in Killian's submucous resection we have now a very satisfactory operation for septal deviation. Post Office employees, for instance, are largely women ; and in the 1914 Report of the British Postmaster-General it is stated that among the staff, deaths and retirements on account of tuberculous disease formed 16·1 per cent. of deaths from all causes and the retirements due to ill-health. In life insurance, women with nasal obstruction—the diagnosis, here as elsewhere, to be made by one trained in rhinology—should certainly be penalized, and it would hardly seem that submission to rhinological treatment ought to exempt altogether from this, since during the period previous to treatment such a person is more likely to have acquired latent tuberculous foci than is a woman whose nasal apparatus is normal.

In men, nasal obstruction is only *pronouncedly* characteristic of the consumptive when unilateral and accompanied by distinct atrophy (evidenced by a view of the posterior naso-pharyngeal wall by anterior rhinoscopy) in the opposite nasal fossa. In Part III, Chapter IV, it was stated that that particular combination occurred 34 times in 359 male consumptives, thus in 9 per cent., but only twice in 321 male non-tuberculous (0·6 per cent.). Men showing this lesion, then, should be excluded from physically selected classes, and recommended to seek rhinological treatment and to take up outdoor employment. Their lives should be 'weighted' ones, in insurance practice.

Lastly, and again in men, it is eight times as frequent in the case of consumptives as with non-tuberculous persons to be able to see posterior naso-pharyngeal wall on both sides on anterior rhinoscopy: this appearance occurs in 8 per cent. of the former as against 1 per cent. of the latter. Therefore this 1 per cent. of the male general population should be dealt with as just described.

So much for prophylaxis by rhinological means of physically selected classes. An application is possible in another direction, viz. to workers in dusty trades. We saw in Chapter V that the simple atrophic rhinitis of consumptives was especially frequent in those of them engaged in dusty occupations. It is to be conjectured that the excess of phthisis morbidity in most of such employments* is due in part to their deleterious effect on the nasal mucosa. For those, then, already engaged in stonemason work, cutlery grinding, and particularly South African gold-mining, a trial might be given to the practical possibility of regular rhinological inspection and treatment. With the problem of gold-miner's phthisis as urgent as it is, even the smallest preventive help should be a boon.

We might now attempt, by way of summing up, some estimate of the degree of control over consumptive morbidity there is prospect of obtaining by employment of the new prophylactic measures above outlined.

Ichthyosis and *squint*, taking the two together, occur in about 2·6 per cent. of consumptives as against 0·6 per cent. of the non-tuberculous. They may therefore be considered to predispose to consumption in about (2·6 less 0·6) or 2 per cent. of all cases of that disease. I have never seen them coinciding with each other in a consumptive or in a non-tuberculous person, but, on the other hand, nasal defect occurs in about half or so of the ichthyotic, and in a few

* Coal-mining must be here excepted, for phthisis is of course comparatively rare amongst colliers. The endonasal atrophy which in Part III, Chapter V, we saw to be frequent in collier consumptives must be offset in its harmful influence on the lungs by a combination of favourable factors, viz. the soft consistence of coal particles, the total large air space of the mines, and the high wages, short hours, and liberal diet colliers enjoy.

of the squinting, consumptives. Ichthyosis and squint by themselves, then, uncomplicated, may be considered to have constituted a danger-signal of consumption in not less than $\frac{2}{3}$ per cent. or 1 per cent. of all cases of phthisis.

Nasal defect occurred 344 times in 500 consumptives (68 per cent.), as against 167 times in 452 of the non-tuberculous (36 per cent.). We may roughly estimate, therefore, that it predisposes to consumption in about (68 less 36) or 32 per cent. of all notified cases of that disease. If we add the 1 per cent. aforesaid, for ichthyosis and squint, there results a theoretically additional preventable proportion of 33 per cent., or just one-third.

Needless to say, nothing like this would be obtained in practice, even by the most strenuous prophylactic application of the principle of early recognition of consumptive tendency. But if the maximum possible reduction of the disease by the measures here advocated be 33 per cent., one might, at a guess, say that a 15 per cent. reduction should be attainable.

Speaking conjecturally, then, but at the same time not without grounds of support, one might indicate a reduction in consumption by nearly one-fifth as not at all unlikely of realization. The gain in life, labour, and wealth represented by this needs no emphasis.

But : it is urged that the faulty physical constitution so frequent in consumptives should at the same time not be ignored. Already much therapeutic activity is directly anti-eugenic. If the careful preservation of these ichthyotic, squinting, nasally malformed, 'degenerate' individuals is to form an express aim of the anti-tuberculosis campaign, quite irrespective of whether or not they show atoning intellectual power, then eugenic measures of some kind should be devised for the purpose of protecting racial physique.

Increased knowledge of diathesis, in fact, brings with it, in view of the broad fact of pathological heredity, a closer responsibility.

Next, a few general remarks upon a subject already dealt with in detail, that, namely, of

TREATMENT.

Every patient with actual or suspected tuberculosis should have a full rhinological examination at the time of the first consultation. What happens in nearly every institution at present is that some patients with obviously something the matter with the nose are sent by their physician to be examined by the laryngologist, while the others are left uninvestigated, even though their larynx may be inspected. Examination of the nose should, on the contrary, be a matter of routine. Even if consumption had no nasal complications at all, this routine rhinological examination would still be necessary in order to exclude du Magny's disease and the other forms of 'pseudo-phthisis' mentioned in Part III, Chapters IV and VI. In both phthisis and pseudo-phthisis a history of nasal symptoms is seldom volunteered. In the latter nasal treatment procures an almost immediately good result, whereas in true phthisis it is only mediately beneficial. However, in both the great principle of removal of a cause may be invoked for nasal treatment.

Under this heading there also falls to be mentioned a small point in the treatment of consumption, which is the superiority of rectal over oral temperature. This superiority, which, in the writer's opinion, follows on other grounds, concerns us here because in mouth-breathers, especially in winter-time, the oral reading is much below the truth. Rectal temperature, however, is difficult to employ outside resident institutions, because of the uncertainty as to whether or not the patient rests for the requisite time before taking it, failing which it has no uniformity. Rhinological treatment of consumptives, which has been noticed in detail in Part III, should be of especial benefit in early consumption—as, for example, to those seen early because of their first symptom being the impressive one of hæmoptysis.

DIAGNOSIS.

If ichthyosis, squint, and nasal defect occur more frequently in the consumptive than in the non-tuberculous, and previously to their consumption, then the fact should sometimes help in early recognition of that disease. When the lungs do not yield characteristic signs and symptoms, then the presumption of tubercle must be strengthened a good deal in presence of a definite stigma of consumptive predisposition.

Thus the squinting consumptive R. R. (see photograph in Part II, male with left-sided convergent squint) was by no means a clear case of the disease when first seen. The history was of cough for many years, rather worse for the last twelvemonth. There had been no blood-spitting, night sweats, or pain in the chest, and only slight loss of weight and strength. He had stopped work as a collier but a fortnight before. No relative had tubercle, or any of his associates. On physical examination the pulse was just under 100, and the respirations were 20. The only signs were pleuritic rubs below the right scapula. The sputum was negative. All this, though fairly suggestive of tuberculosis (and it should be remembered that every case sent to a dispensary is at least that, so that to diagnose tubercle on fairly likely histories is to diagnose it in 100 per cent. of patients) was by no means conclusive. But as the man squinted, and was red-haired—remember Landouzy's statement that whenever he saw a red-haired patient in the wards he asked for the diagnosis, and was nearly always told tubercle in one form or another—and, moreover, said he had always been a poor eater, consumption was diagnosed, and the patient sent to the sanatorium. In the course of his stay there, although on the whole he did well, and is in fact at work now, two years after leaving, tubercle bacilli were found in the sputum.

Nasal defect, if manifested by those particular signs and symptoms which we saw by comparative tables (in Part III, Chapters IV and VII) to preponderate greatly in the

phthisical, has diagnostic significance certainly no lower than that of ichthyosis or squint, and, from its greater absolute frequency, much more often available. Two cases will be cited illustrating this point with a fair amount of conclusiveness.

The first was that of a platelayer, *aet.* 24, who had had for seven weeks cough and sputum with no loss of weight. Three years previously he had vomited, not coughed up, half a gill of blood. No definite family history of tubercle or of exposure to infection. The physical signs were slight loss of resonance at the right apex, with one or two adventitious sounds above the right clavicle on deep inspiration, together with some dulness and a pleuritic rub at the right base. Sputum negative. On nasal examination a septal spur was seen so large as to meet the inferior turbinate, while in the opposite nasal fossa the posterior wall of the naso-pharynx was visible on anterior rhinoscopy. This particular combination—nasal obstruction on one side plus atrophy on the other—was, it will be recalled, found in Part III, Chapter IV, to exist in 34 out of 359 male consumptives as against 2 only out of 321 non-tuberculous males, i.e. more than a dozen times as frequently in the former class. Its presence in this platelayer was therefore considered to confirm the other, and by no means certain, evidence of phthisis, and the man was sent to the sanatorium. Here, the patient being given tuberculin injections, a curious thing happened. He had long had a papular eruption on the left cheek, and this now reacted to each injection, to such an extent that much discomfort was caused and shaving became impossible, so that the injections were rightly given up. The significance of this fresh occurrence was of course very great. If a person strongly suspected of phthisis on other grounds has a skin lesion proved by focal reaction to be a tuberculide, it becomes almost indubitable that there is a tuberculous basis also for his lung signs and symptoms. The subsequent progress of the case was confirmatory. After discharge from the sanatorium he kept well and at work for eighteen months, when a temporary

recurrence of the right-sided pleurisy, coming after the events just described, made its tuberculous nature certain.

Again, the girl shown in the frontispiece to Part III had been sent away from school in a neighbouring county for loss of voice; and according to her mother had been attending a tuberculosis dispensary there for ‘consumption of the throat.’ For six months hoarseness and some pain on swallowing had existed, while the posterior laryngeal wall was rather thickened. When her nose was (for the first time) examined, ozaena was found. On treating this, the resultant simple chronic laryngitis cleared up in a few weeks. The only evidence of pulmonary phthisis—there was no cough or haemoptysis, very slight alteration in weight, and a trifling amount of sputum, negative on examination—was the right-sided shoulder drooping visible in the photograph. This perhaps not all sufficient sign was, however, in the presence of ozaena, enough to make tubercle of the right lung certain. Here the rhinological evidence corrected not only the diagnosis, but therewith the treatment.

There is a rare but possible fallacy in assessing the rhinological signs of pulmonary phthisis, which is when the nasal defect is of syphilitic origin. The intra-nasal damage caused by tertiary syphilis does probably, as we saw in Part III, predispose to consumption, and thus chronic lung trouble in such a subject is proportionately likely to be of a tuberculous nature. Very rarely, however—for syphilis of the lung is extremely rare—both lesions, nasal and pulmonary too, may be syphilitic. This was probably, not certainly, so in the following instance, which, though not fully investigated, seems instructive :—

George G., bricklayer, *æt.* 32, married, was seen in July 1914, having been notified as a case of pulmonary phthisis. He had been ill since the previous autumn, and was in bed with cough, eight ounces daily of purulent but negative sputum, emaciation and night sweats, the temperature, however, rarely exceeding 99°. The pulse was 120 and the respirations 21. There was a history of an ‘abscess’ over the fourth right rib in front, which being incised soon healed. The physical signs were dulness over nearly the whole right lung, the breath sounds from the angle of the scapula downwards being absent, while vocal resonance and tactile vibration were much diminished although not lost.

This right base had already been needled twice with no result, an observation which the writer repeated. Despite the basal distribution of the signs and the negative sputum, the case looked exactly like advanced phthisis, and since the disease was unilateral, he recommended artificial pneumothorax treatment and made three punctures about the level of the scapular angle, without striking the pleural space. Next day, higher up, opposite the scapular spine, pleural oscillations of minus 6 (cm. H₂O) in inspiration, and minus 5 in expiration, were obtained, and 235 c.c. of nitrogen gas introduced, which raised these negative pressures to plus 4 and plus 6 respectively, with a mean reading (by means of Kjer-Petersen's screw) of plus 4. Evidently, therefore, the pleural space had been much limited by adhesions; and as no therapeutic or dilating effect followed further operations at other apical sites, this treatment was given up. It had been noticed that the signs of pneumothorax had been exclusively at the pulmonary apex, which seemed an unusual state of affairs* in pulmonary tubercle, which has so strong, if not exclusive, predilection for the lung apex. Mainly for this reason, it was thought, although not said, that the disease was probably non-tuberculous.

A year later the general practitioner in attendance on the case reported on the form used for domiciliary patients that it was non-tuberculous and that the man had recovered and gone back to work.

A year later again (June 1916), having ascertained that he was still working, I wrote for medical particulars of his progress, and without waiting for a

* Later investigation supports this opinion. I have nowhere seen reported a case of phthisis where the lung compression by artificial pneumothorax was exerted from above downwards, whereas the opposite condition in incomplete pneumothorax, where the base of the lung is collapsed against an adherent apex, is of course very common. In *Le Pneumothorax Thérapeutique* for December 1915 (p. 147), Vittorio, in a proposed classification of radiological appearances in artificial pneumothorax treatment, enumerates only the following forms:—

1. Partial pneumothorax of the base; with vertebro-apical compression of the lung.
2. Partial pneumothorax, basal and lateral; vertebral compression.
3. Partial pneumothorax of base and mediastinum; pleuro-lateral compression.
4. Multi-locular pneumothorax; with multi-lateral compression.
5. Total pneumothorax; central compression.
6. Hydro-pneumothorax.
7. Hydro-pneumothorax at superposed levels (swallow's-nest effusion).

Thus a pneumothorax of the apex, with diaphragmatic compression of the lung, which occurred in G. G., is not mentioned even in a communication from Italy, the home of artificial pneumothorax treatment of consumption.

Again, as bearing on our drawing diagnostic indications from artificial pneumothorax, one may cite Giuffré, who opines (*idem*, p. 164) "que la méthode peut être d'une grande utilité pour le diagnostic de lésions intrathoraciques." He recalls "qu'il a pu une fois diagnostiquer une néoplasie de la plèvre, après avoir pratiqué un Pneumothorax modique." Brauer, using collapse-therapy in conjunction with radiography, has made previously the same suggestion.

reply went to see the man. I found him well and strong, without cough or expectoration, heavier than ever before in his life, working full hours at his trade, and able to bicycle up hills. His wife had a healthy infant four months old. In the lung the dulness had largely cleared up; the breath sounds were diminished, and absent only at the extreme base; over the lower third expiration was prolonged, an important sign, because the first one conclusive of endopulmonary involvement. Then, as ought to have been done two years previously, I examined his nose. There was a very large septal perforation to be seen, involving the bony as well as the cartilaginous portion, with thick crusted edges, which seemed certainly syphilitic. On questioning he gave a history of stuffiness in the nose at the time of his chest ailment. He had been a soldier from age 19 to age 27, much of his time in India; he owned to connexion with prostitutes there, but not to venereal disease. The only illness he had had in the army was 'synovitis of the right knee.' Of his three children, the eldest, and the youngest above mentioned, seemed healthy, while the intermediate one died at the age of five weeks. No history of miscarriages.

The practitioner who had attended him wrote as follows:—

"After you saw G., I sent him in to the infirmary as a surgical patient, but he was transferred in a couple of days to the medical side. Whether any diagnosis was made I do not know, but nothing was done, and after a couple of weeks he came home rather disappointed. He continued to bring up pus, and some time after I found his urine loaded with albumin, which led me to believe he had amyloid disease of his kidneys, resulting from suppuration. This opinion was strengthened when some time after he had an attack of delirium one night which seemed probably due to uræmia. His water was examined about once a week, and suddenly one examination showed no albumin whatever. I found it difficult to believe the specimen genuine; but it was. After this the urine was sometimes highly albuminous, sometimes quite free, and it appeared clear that an abscess must be periodically discharging through some part of the urinary system. After a couple of months more, expectoration ceased and albumin disappeared. Had he an empyema on the under surface of the right lung, or had he an hydatid cyst? Or can you suggest anything else?"

The points in favour of a diagnosis of pulmonary syphilis in this case were proportionately very many. To begin with, the man's stay as a soldier in India. The writer was formerly medical officer to a battalion in that country, and noted that quite half of the men had syphilis entered on their medical history sheet; probably a good few more had also contracted this disease. The synovitis of the knee already mentioned was probably a mild attack of the arthritis so common with syphilis. The abscess over the fourth rib was probably periostitis, again a common syphilitic manifestation: Fowler and Godlee (3), in their valuable section on pulmonary syphilis, say under *Diagnosis*:

3. Fowler and Godlee: *The Diseases of the Lungs*, London, 1898, p. 450.

"Careful search should also be made for lesions of the calvarium, of the dura mater, and of the sternum and ribs." They also mention copious sputum and night sweats as common symptoms. The physical signs in 1914 were certainly those of thickened pleura, and three out of the five post-mortem specimens of pulmonary gumma cited by the above authors showed much thickened pleura over this lesion. It is also perhaps significant that the lower part of the right lung should be affected, on account of its proximity to the liver, a very common site of gumma. The prolonged expiration, heard in 1916, is of course a sign often indicative of pulmonary fibrosis, and fibrosis is a frequent feature of pulmonary syphilis. Again, the slight history of nasal symptoms is significant, for it is known that an intra-nasal gumma breaks down without much in the way of symptoms, and so easily that it is rarely seen, perforation having already taken place by the time the patient comes to the rhinological clinic. Then the way the lung collapsed under treatment was, as has been said, uncharacteristic of tubercle, and so also was the clinical course of the disease. Consumption has many varieties, but untreated recovery, as sudden as it is complete, from an advanced stage, without sign of relapse for nearly two years, is a termination unfortunately unknown. The absence of miscarriages on the part of the wife, and the good health of two out of the three children, seem to be the only adverse arguments; but of course a syphilitic, particularly a tertiary syphilitic, may beget healthy children. Finally, the heavy albuminuria, so common in lardaceous renal disease, which again is so often associated with syphilis, turns the balance altogether in favour of the diagnosis of pulmonary syphilis. The complete health and recovery precluded one from obtaining a specimen of blood for trial of the Wassermann reaction; not that that would have helped very much, for syphilis was practically certain from the rhinological evidence and the history.

* * * *

But this last case is a rarity; on the whole a perforation

of the septum in a chest patient goes for tubercle, as we saw in Part III, Chapter III. So, more strongly, do the already mentioned nasal lesions characteristic of the phthisical; and ichthyosis; and squint. When these stigmata of predisposition coincide with an early sign of consumption, it has been the writer's practice to diagnose the latter at once. But before giving illustrative cases, it will be necessary to devote a small digression to two such signs, because their unequivocal character makes them suitable to our argument, and because in this country they seem never to be remarked, neither abroad, indeed, to have had the notice they deserve.

The first is that shown in the frontispieces to Parts II and III, namely shoulder-girdle depression on the affected side. Aufrecht of course described sinking of the acromial end of the clavicle over the diseased lung as a sign to be looked for. But Krönig (*loc. cit.*)—a fact unmentioned in a well-known text-book like that of Bandelier and Roepke—went further, and indicated that the half of the shoulder girdle might be depressed, the right half when the right lung was diseased, and vice versa; so that the point of one shoulder, and the angle of one scapula, and in males and nulliparous females one nipple, might be at a much lower level than the corresponding parts, and the depressed scapula approach the spinal column. I have often seen a scapula 3 inches lower than its fellow in an early case of phthisis. Altogether this has seemed a valuable sign, especially in children, in whom grounds for diagnosis are often so scanty. In early disease it may have prognostic as well as diagnostic significance, for since its production must take some time, it points to mildness and chronicity of the lung lesion.* It has also, as said, the great virtue of pure objectivity. Patients, when it is brought to their notice, will often say that it is occupational, but this cannot be, for it is found as often in women, and proportionally (the right lung is affected by consumption oftener than the left, of course) with equal frequency on both sides of the body.

* Sometimes, however, it may possibly be pre-tuberculous. There is a somewhat similar asymmetry described in lunatics.

The other sign is also mainly due to Krönig, and consists in pulmonary apical tenderness to direct (also often to indirect) percussion, a phenomenon to which he, making the plea '*sit venia verbo*' for a mongrel word, has given the name *apicalgia*.

Of course it had not escaped all notice previously. Louis(4), in a pathologically based study much quoted in its day, and still of service, said: "It is further worthy of remark that percussion of the walls of the chest is pretty frequently productive of pain, more especially of the side chiefly affected, and, generally speaking, at the summit of the chest." Murat(5) mentioned distinct tenderness to pressure of the suprascapular region as indicative of phthisis. There have probably been others—indeed, some text-books give it passing mention—but to Krönig belongs the credit of laying stress on this as a sign of *early* consumption. He explains it, probably enough, as the result of acute or subacute apical hyperæmia, or of inflammatory adhesion of the layers of the apical pleura. Of course the significance of apical pleurisy is almost absolute. Sir C. Allbutt (6), in a lecture entitled *The Relations of Pleurisy to Tuberclle*, described it as 'not far from an axiom to say that a streak of pleurisy audible at the apex means pulmonary tuberculosis.' He alluded especially to the region of the spine of the scapula, where, as we have seen, Murat placed his diagnostic tenderness.. But how often is apical pleurisy distinctly audible? The lecturer himself made a good deal of the fallacies involved, speaking of 'elusive apical rubs,' and indeed he is supported here by a specialist of the rank of Turban, who goes further, and declares himself unable to distinguish certainly between endo- and exo-pulmonary adventitious sounds. But there is nothing ambiguous about a flinch on the part of the patient when percussed; besides, for every case yielding as sole sign a faint apical

4. P. C. A. Louis: *Researches on Phthisis*, Sydenham Society's translation, London, 1844, p. 179.

5. Murat: *Journal de Médic. et Chirurg. pratique*, 10 January 1889.

6. Clifford Allbutt: *The Lancet*, 30 November 1912.

creak, there must be ten showing as sole sign apicalgia. Sir Clifford Allbutt's 'narrow streak of inflammation' of the apical pleura is, in other words, oftener palpable than audible. His conclusion, and Krönig's conclusion, that it means consumption, cannot be doubted. Apicalgia is a physical sign that takes a long time to disappear under sanatorium treatment, and it will recur with relapse with great constancy. Nevertheless, I have seen a consumption hospital physician astonished at the idea of diagnosing phthisis because a man winced slightly when one clavicle was tapped. However, if the evidence of apicalgia or of other small signs of phthisis be reinforced by the evidence of ichthyosis, squint, or characteristic nasal defect, no hesitation need be felt.

Thus E. L., the girl figured as frontispiece to Part II, had been under observation for some time at a tuberculosis dispensary because of slight phthisical symptoms together with a tuberculous family history. The physical signs were noted as "query harsh breath sounds at the left apex." She showed great drooping of the right half of the shoulder girdle, which appears in the photograph. The right scapular angle was some inches lower than the left one. Also there was slight narrowing of the right apical isthmus of resonance. Coinciding as these did with squint, the case was clearly one of consumption, of a very favourable type for sending to the sanatorium.

Again, E. S., a factory girl, æt. 16, came with an only fairly characteristic phthisical history. The sputum was negative, the pulse 80, the respirations were 18, and there was no family history of tubercle. The physical signs were a couple of rhonchi over the right apex, slightly sharpened apical inspiration on both sides, and slightly prolonged expiration under the right clavicle. There was also long standing nasal obstruction, the anterior ends of both inferior turbinals being enlarged. As nasal obstruction is so infrequent in non-tuberculous women, she was at once recommended for the sanatorium.

Case XII of our ichthyotics (see Part I) was one in

which, although presenting itself at a tuberculosis dispensary, tuberculosis would not have been confidently diagnosed had it not been for his ichthyosis.

* * * * *

So much for examples, which may or may not commend themselves to the reader, of the *positive* use of our diagnostic aids, when their presence has clinched the conclusion. Could their absence, conversely, be taken as evidence excluding tuberculosis, or, rather, making it less likely?

Manifestly not as regards ichthyosis and squint, the absolute frequency of which is so small. But in the case of nasal defect, which is found in two-thirds of all consumptives, its absence—i.e. a normal nasal condition—should count a little diagnostically, for a normal nose is much commoner in healthy than in non-tuberculous persons.

It is impossible to give many instances of this ‘negative’ application of rhinology to the early diagnosis of tubercle, because a negative is notoriously hard to prove, and cases in which in the light of after events tuberculosis could be excluded with certainty must always be rare. However, the following is one in point:—

J. F., an elderly man, was admitted to a sanatorium, having been considered by three physicians (including the writer) who had examined him to be a case of consumption. He appeared to be in Turban’s Stadium II. The sputum was found negative on more than one occasion. He suffered from a good deal of pain in the left side of the chest, and as this and his general condition got no better, he soon returned home. Later he entered a provincial infirmary and died there. The necropsy revealed sarcoma of the lung and spine. On looking up his notes to add this result to them, I found the entry as to his nasal condition to be: “Nose slightly dryish (patient is a warehouseman), *post-nasal space* nil abnormal; *anamnesis* nil.” Thus in this case of malignant disease of the lung simulating consumption, the nasal condition was normal.

And generally, in pronouncing against tubercle, a normal nasal condition, in the event of its being present, has been taken into due consideration. But it should be said, in conclusion, that except for pulmonary syphilis and for

du Magny's disease, this contribution to the diagnosis of consumption is concerned with the separation of that disease from bronchial catarrh or other slight ill-health, not with its separation from definite and serious non-tuberculous pulmonary disease. To enter similarly upon the latter question, one would require to be equipped with a knowledge of the percentage frequency of ichthyosis, squint, and nasal defect in at least 200 cases each of chronic bronchitis, emphysema, bronchiectasis, lung cancer, actinomycosis, etc., cases, too, from which tuberculosis had been definitely excluded. To collect such information would be a work of many years. But for practical purposes the omission is matterless. The diseases named are infrequent in the slightly ailing adolescent or young adult who forms the staple subject for early diagnosis of tubercle; and they mostly soon declare themselves in other ways and by ordinary physical signs. Besides, in the case of most of them, there is no *a priori* probability from which the co-existence of the chief of our three anomalies, namely nasal defect, might be supposed.

PATHOGENY.

Squint excepted, the signs of predisposition have again their lessons regarding the source of the invading bacillus, and the route and plan of its invasion. Tuberculous infection cannot be directly favoured at all by squint: the vulnerability to consumption often involved therewith must be in virtue of some associated weakness or malformation; of which latter we can only say that it is not likely to be of the nasal apparatus. *Ichthyosis*, on the contrary, is frequently found conjoined with nasal defect in tuberculous subjects, the bearing of which fact on the pathogeny of phthisis will naturally be discussed with that of nasal defect in general. Ichthyosis and xeroderma *not* so conjoined may, as stated, favour infection *trans cutem*. Here the ultimate source of the injurious bacilli must be dust from the air, for the skin of civilized man is not apt to come into contact with tuber-

culous meat and milk, or with the discharges of tuberculous persons, unless belonging to certain occupations (physician, sick attendant, butcher, dairyman, etc.) not found in our ichthyotic-tuberculous cases mentioned in Part I.

In the case of *nasal defect* this strong likelihood of aerial origin becomes a certainty. A fault of the respiratory apparatus leading to consumption cannot point elsewhere than to the air as the source of the invading micro-organisms, a deduction of great practical import, and one in harmony with the well-known bacteriological findings which record tubercle bacilli of the human type, the kind much more likely to be acquired from air than from food, as being present in the lesions of pulmonary tubercle vastly more often than the bovine kind is. The distribution of the *typus humanus*, which is found in nearly all cases of consumption, and less often, but still preponderantly, in surgical tubercle, is again in harmony with our theory of tuberculous pathogeny in the Equidæ, already alluded to in Part III, Chapter VIII. The Equidæ, who are largely protected from aerogenous tuberculous infection by exclusive nose-breathing, and who are little subject to tubercle at all, are especially immune from its primary pulmonary form ; suffering from tuberculosis, when they do suffer, in the abdominal organs and in clear relation to alimentary infection.

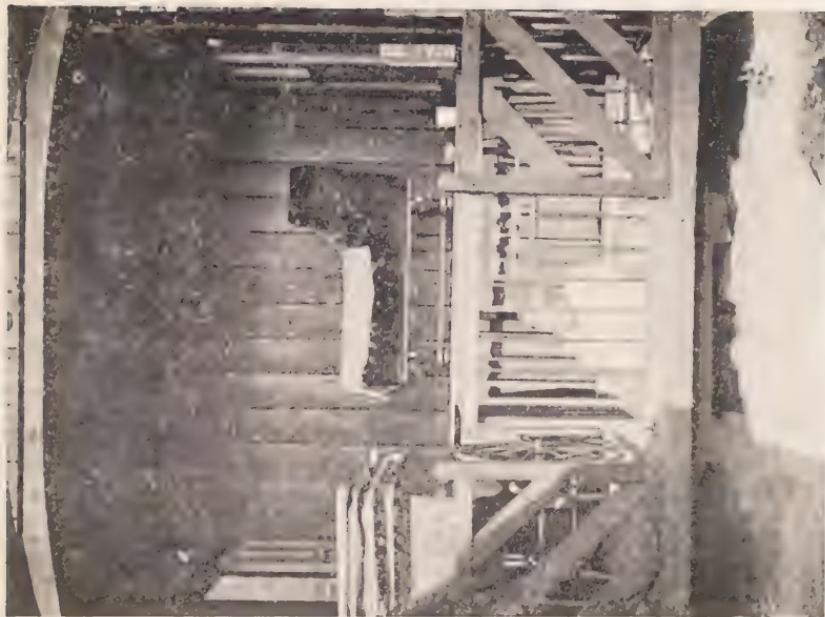
On the details of phthisical pathogeny, the channels of pulmonary tuberculous infection, our new evidence bears very little, although it confirms the explanation of the predilection of *lupus vulgaris* for the face by an intra-nasal origin. At first sight it would seem as if the occurrence of phthisical infection by inhalation is indicated. But a chronic mouth-breather will swallow as well as inhale tubercle bacilli of aerial origin ; he may also infect the faucial or lingual tonsil with them. Again, the subject of atrophic rhinitis, in whom lymphatic atrophy has not gone to an extreme, may get wounded by an air-borne pellet of infection in the naso-pharyngeal or lingual segment of Waldeyer's ring, and perhaps receive the rest of the charge

in his lungs. I have not been able to make out any clear difference, in the character of the pulmonary lesion, between mouth-breathing consumptives and consumptives of the 'atrophic' group. Ichthyosis complicating consumption may possibly point to occasional infection by the skin. But by the time an ichthyotic-consumptive subject comes under notice, any signs of the route of invasion have usually been effaced. In all three anomalies, earlier observation, besides serving prophylaxis and treatment, might also serve the study of tuberculous pathogeny.

However, this hiatus matters the less, because obviously the main purpose of all those experiments designed to ascertain whether the virus was inhaled or ingested, was to determine whether air or food was its source, which again would give a line as to the best prophylactic procedure. That they were unsuccessful is well-known. Those (school of Calmette) who pointed to animals, exposed to an atmosphere of lamp-black with the œsophagus tied, which yet showed no carbon particles in the lungs, were answered by others (school of Flügge) with other animals, which under similar conditions showed copious anthracosis. Similarly with infection experiments with tubercle. The explanation of the contradictory crucial experiments of course lay in the arrangement of details. Roughly, a mouth-breathing animal, exposed to heavy clouds for a long time, gave the latter result, and a nose-breathing one, treated more lightly, the former one. Injury to the vagus when tying the œsophagus was also deemed a disturbing factor. As most of these, and other, details were quite arbitrary, and a fair standard of resemblance to 'natural' processes of infection quite undeterminable, the matter remains unsettled by laboratory experiment. Other grounds, although on balance favouring the air hypothesis, have afforded no certain conclusion, so that our new evidence, that in a considerable proportion of consumption the air is the infecting medium—the air, as it were, the base of the enemy's operations—this new evidence reinforces effectively and conclusively those other arguments (such as presence of human tuber-

culosis coinciding with absence of bovine tuberculosis, etc.) for aerogenous as paramount over alimentary tuberculous infection; which of course was practically Koch's contention.

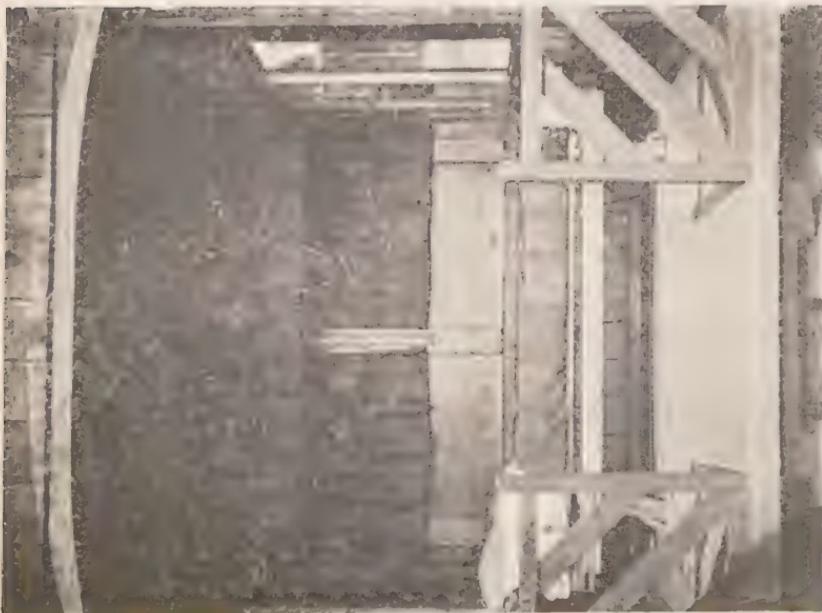
So that in the anti-tuberculosis campaign air-purity and ventilation should be the principal prophylactic measures. It is urged that these should be pushed far more with regard to the rising generation, whose conversion is more hopeful and of more promise than that of adults. To begin at the beginning, the blanched, debilitated appearance of working-class infants seems, if one contrasts them with infants put on every possible occasion into the open air, to be due largely to their confinement indoors and to the extravagant veiling and sheltering which they come in for. The indoor life of northern civilized nations is unnatural to the primitive constitution of man, a fact which must tell injuriously on the young of the species, for stockbreeders take pains to give the young of domesticated animals life conditions as feral as possible. Probably a more rational upbringing would save many a child from becoming 'positive' to the v. Pirquet skin reaction at the age of two years or so. This requisite upbringing is far from being wholly dependent, as often opined, upon housing reform. A larger dwelling could be kept just as stuffy as the small one was: indeed, a small room, *ceteris paribus*, can have its air changed more quickly than a big one. The real obstacles are the habits of the inmates. It is cold and discomfort which are the prime factors operating against the wide-open window. The working man, who when indoors is always in his shirtsleeves and often in his stocking-feet, likes warmth and stuffiness there except in the height of summer. In winter his bed-covering is often not sufficient to keep him comfortable if the bedroom window stands, as it should, wide open, while a stone-cold bedroom (he cannot afford a gas stove) makes early rising doubly unpleasant. Widespread housing reform, on which millions might be spent, might very well leave the mischief, *qua* tubercle, very much where it was. This is not to say but that the addition of fresh window space would



7. 7' WOODEN SHELTER USED AS CRUCIFIX BY DAY.

The curtained wooden shelter is hung back to the back wall of the shelter, and when the bed is made in the morning it is simply lowered to form a rustic sheet over the bed, supported by a central folding leg and by ledges at the sides.

To face p. 190.



be highly desirable. But the real remedies would seem to be general social amelioration coupled with systematic personal education of the rising generation.

The infants aforesaid have no habits or prejudices to be overcome, while it has been found that working-class mothers feel themselves challenged by the rosy appearance of babies brought up on the opposite plan to their own, and are anxious to obtain as good a result. Once this maternal emulation is fostered, and the fear of open air overcome, there are few practical difficulties in the way. Even the poorest household can afford enough clothing and wraps to keep small children warm when out of doors, and every one has a perambulator to put them in. The only thing lacking is provision for bad weather, for shelter from rain, in the yards and gardens attached to what is known as 'weekly property.' Summerhouses, open-air shelters, huts, and the like should therefore be provided on a much greater scale than at present, and used for accommodation of the babies and young children of the family by day and of the bigger boys at night. In the latter respect the Boy Scout propaganda might be of help; but juvenile tastes being what they are, there would be very little difficulty in getting boys to sleep out of doors. The habit would in most cases continue in after-life, for there is a charm about outdoor sleeping. Unsupervised consumptives often get careless about treatment, but I know of none who, having been given a sleeping shelter, has voluntarily left it for a bed indoors. The taste for an open-air life once implanted in the rising generation, an improvement in indoor ventilation would follow in due course of time, when these came to have houses of their own. Nor must the immediate relief to congested bedroom space be forgotten.

Through existing channels, health visitors and the like, all possible endeavour, therefore, should be made to secure a general taste for clean air to breathe. Thus indirectly prophylactic effects should follow, supplementing powerfully those direct ones already recommended under the first heading in this Part.

Lastly, as to the *period of life* at which tuberculous infection occurs.

There is a well-known theory that all adult tuberculosis is but a recrudescence of a juvenile infection; and although this can hardly be maintained, in view of such facts as the occupational incidence of consumption, yet, if stated in a more limited way, it has undoubtedly strong grounds of support. We find it confirmed by the evidence of many tuberculous subjects having had adenoids in childhood, and by the observation of intra-nasal atrophy existing at a very early age. Ichthyosis is worst in childhood, too, while squint becomes manifest in most cases halfway through the first lustrum. All this is a further argument for the adoption of puericulture of the kind already mentioned. But we also found that a history of nasal obstruction dating from trauma to the nose (often in adolescence) was commoner in consumptives than in the non-tuberculous, while of course the usual age at which septal deviation or ozæna develops is about puberty. And if senile mouth-breathing is a causative factor of senile tuberculosis, that would show infection from without taking place very late indeed. Old people hate fresh air.

Altogether, then, our new evidence is not in favour of the possibility of establishing any particular time of life as exclusively important for tuberculous infection.

HEREDITY, FAMILIAL INCIDENCE.

As already mentioned, these strong general features of ichthyosis may also be traced in the relations of this disease with tubercle. We saw that, in two pedigrees, ichthyosis and tuberculosis came together into the family, and were associated to a large extent in the succeeding generation also. The inference from these pedigrees is that ichthyotic vulnerability to tubercle is a transmissible quality. Case XIII (Part I) is interesting in this connexion, because there the physical quality of pigmentation was transmitted along with the ichthyosis. A French dermatologist has stated that in his country ichthyotics have often hair and

complexion of a certain colour.* If, then, the associated quality of pigmentation is transmissible with the ichthyosis, so, too, may be the associated quality of phthisical predisposition. Lastly, when we surveyed all the members of the families recorded, we found that the ichthyotic members became consumptive much more often than the non-ichthyotic members did.

The practical applications of these findings and deductions are that when an ichthyotic-tuberculous subject is met with, not only the 'contacts,' but the rest of his family (and if possible collaterals), should be examined for both diseases, and warning be given as to the special risk of phthisis incurred by any ichthyotic relation, whether at home or away. This course was followed by the writer in several of the 23 cases given in Part I. Any nasal defect present should be looked to. Not only on *a priori* grounds is it likely that such preventive measures would have some success. I have in mind here the instance of a healthy septuagenarian farmer with ichthyosis. Two or three of his sons were likewise ichthyotic, but the only one of these (or of the whole family) to become consumptive was also the only one who took up an urban employment. The others, leading outdoor lives in the country, kept their health.

In view of the frequency of transmission of ichthyosis through a female, girls belonging to a consumptive-ichthyotic family should not marry. When the risk of phthisical tendency is superadded to that of some congenital malformation, the chance of healthy offspring becomes too small to justify marriage.

As to *squint*, our material is of course too scanty for comment under this heading.

The matter of *nasal defect*, in its bearing on phthisical heredity, is obscure, but chiefly so, probably, for want of full data. To get a family history of squint is easy, should

* For a cognate instance of association of pigmentation with a disease compare the myopia so frequent in brown eyes; and both shortsightedness and brown eyes are transmissible by heredity.

such exist, because the parents or other relatives can tell as to its presence or absence in any member who survived infancy, whether dead or living. A family-tree of ichthyosis is only slightly more difficult. But to get a history thus of nasal defect is obviously impossible, because to ascertain its presence medical examination is needed. Moreover, the other phthisical members of the family, whose nasal condition would be of particular interest to compare with that of the patient, are mostly dead. Therefore one can very seldom directly relate the family history of nasal defect with the family history of phthisis.

But from the following data one can learn something as to the familial distribution in consumptive families of various forms of non-tuberculous nasal abnormality. These data, which might have been produced before, in Part III, but which it has been judged better to collect and deal with here, are now appended.

I have observations of 42 families, quite unselected, and all of them, save one, of patients from the material of 500 sputum-positive consumptives already repeatedly mentioned. These 42 patients are made up of 25 men and 17 women. The particulars below give the nasal condition of the patient and of one or more members of his or her family: but very rarely could the whole of the family (by which is meant mother, father, brothers, and sisters) be examined. The asterisk prefixed to a member of a family means that appropriate operative rhinological treatment was recommended to him or her and known to have been carried out; non-operative treatment was applied much oftener. The cases are, as will be noticed, arranged under the four headings used in Part III, viz.:—

1. Cases of nasal obstruction and mouth-breathing.
2. Atrophic cases.
3. Cases with other nasal defect.
4. Nasally normal cases.

1. OBSTRUCTION.

| <i>Male.</i> | <i>Female.</i> |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| S., deviated septum, dislocated septal cartilage, sinusitis. | I., deviated septum, adenoids. |
| *Sister, deviated septum. | <i>Mother</i> , normal. |
| Brother, normal. | <i>Father</i> , deviated septum, adenoids. |
| C., deviated septum, sinusitis. | C., deviated septum, adenoids, rhinitis. |
| Brother, deviated septum. | <i>Mother</i> , normal. |
| Twin sisters (one phthisical): both had deviated septum and projection of superior incisors. | <i>Brother</i> , normal. |
| | <i>Father</i> , collapsed alæ nasi, rhinitis. |
| | <i>First sister</i> , adenoids, septal spur. |
| | <i>Second sister</i> , rhinitis. |
| S., deviated septum. | A., projection of superior incisors. |
| Brother, normal. | <i>Mother</i> , the same. |
| S., dislocated septal cartilage, enlargement of inferior turbinated bodies. | A., adenoids. |
| Brother, normal. | <i>Mother</i> , adenoids. |
| Father and sister, intra-nasal dryness. | <i>Father</i> , normal. |
| M., deviated septum, enlargement of inferior turbinates. | T., projection of superior incisors, slight dislocation of septal cartilage. |
| <i>Father</i> , normal. | <i>Mother</i> , slight dislocation of septal cartilage. |
| <i>Mother</i> , slight dislocation of septal cartilage and projection of superior incisors, polypi left side. | <i>Brother</i> (phthisical), normal. |
| Sister, deviated septum. | |
| *Brother, deviated septum, dislocated septal cartilage. | |
| B., dislocated septal cartilage, anterior perforation of septum. | J., deviated septum, edge-to-edge bite. |
| <i>Sister</i> , narrow nose, collapsed nostrils, adenoids. | <i>Sister</i> , underhung lower jaw. |
| B., collapsed nostrils, dislocated septal cartilage, adenoids. | M., projection of superior incisors. |
| <i>Mother</i> , normal. | <i>Mother</i> , rhinitis. |
| <i>Sister</i> , superior projection. | <i>Sister</i> , projection of superior incisors. |
| | <i>First brother</i> , normal. |
| | <i>Second brother</i> , deviated septum, projection of superior incisors. |
| | <i>Third brother</i> (phthisical), deviated septum, adenoids. |
| | A., deviated septum. |
| | <i>Mother</i> , normal. |
| | <i>Sister</i> , slight dislocation of septal cartilage. |

B., dislocated septal cartilage.
Brother, deviated septum.

A., septal ridge.
First brother, deviated septum.
Second brother, the same.

B., adenoids.
Father, normal.
Brother (phthisical), vertical nostrils,
 dry nose, unilateral atrophy.

H., deviated septum.
Sister, normal.

J., deviated septum.
Mother, normal.
Sister, simple atrophic rhinitis.

R., rhinitis.
Father and brother, normal.

W., deviated septum, septal spur,
 slight projection superior incisors.
Father, normal.

S., deviated septum, narrow nose.
Sister, normal.

R., dislocated septal cartilage.
Two sisters, normal.

P., dislocated septal cartilage.
Sister, normal.

P., deviated septum.
Mother, normal.
Sister, narrow nose, septal spurs.

P., deviated septum, inferior turbin-
 ate enlarged.
Brother (phthisical), deviated septum.
Sister, normal.

2. ATROPHIC CASES.

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| W., ozæna. | T., bilateral atrophy. |
| <i>Brother</i> , dislocated septal cartilage. (This patient said that in his family only he and his sister had broad, flat noses.) | <i>Mother</i> , the same. |

F., ozæna.

Brother (phthisical and scrofulous),
bilateral atrophy.

F., ozæna.

Mother, milder ozæna.
Brother, normal.

Y., bilateral atrophy, sphenoidal sinus-
itis.

Mother, bilateral atrophy.

First sister, nasal crusting, very roomy
nose, edge-to-edge bite.

Second sister, unilateral atrophy.

First brother, deviated septum.

Second brother, rhinitis sicca.

W., bilateral atrophy.

Sister, the same.

3. CASES WITH OTHER NASAL DEFECT.

S., unilateral atrophy, dry nose.

Father and mother, normal.

P., pale mucosa, dilated veins on
anterior part of septum, especially
the right side. Long-standing epis-
taxis.

Mother, polypoid degeneration of right
middle turbinate, and history of
fœtid nasal discharge.

Sister, nasal crusting.

C., rhinitis sicca.

Mother, normal.

Brother, rhinitis.

K., unilateral atrophy.

Mother and brother, normal.

4. CASES WITH NORMAL NASAL CONDITION.

D., normal.

Sister, normal.

S., normal.

Mother, normal.

J., normal.

Mother, normal.

R., normal.

Sister, deviated septum.

A., normal.

Sister, unilateral atrophy.

Concerning the above families it may be remarked, *firstly*, that 79 relations of the 42 patients were examined, and that of these 79, 40, i.e. half, showed definite nasal abnormality.

Now, this is a higher proportion of nasal abnormality than obtains in the general population, our random sample of which we saw in Part III to be nasally abnormal only to the extent of one-third. Therefore it is likely that unselected relatives of consumptives have nasal defect more frequently than the general population.

The excess cannot, in the above instance, be due to the relatives themselves being phthisical unduly often, for we find that only 6 relatives out of the 79 were so.

But of these six, all except one had nasal abnormality, and although such numbers are far too small to generalize from, yet it is possible, on grounds already set forth in this essay, that familial tendency to nasal defect may sometimes partly account for family tendency to consumption—just as familial tendency to ichthyosis may. One must not make too much of this probability. Consumptives with normal nasal passages do not, I find, give a family history of phthisis less often than *nasenleidend* ones do. There may be other hereditary and familial characters to reckon with, such as poverty of physique or mental unsoundness. Nevertheless, on occasion, in individual instances such as some of those given above, the clue to hereditary or familial tuberculous predisposition furnished by rhinological examination may be important.

Secondly, it may be remarked that the family nasal defect of consumptives seems to be broadly similar in type in the members of a family. If a consumptive has nasal obstruction, his father or mother or brothers or sisters are likely to show some of the manifestations of nasal obstruction too; the same with endonasal atrophy. Thus, while nasal obstruction and mouth-breathing are not common in the female sex—we saw in Part III that of our female controls only 12 per cent. were thus affected—yet among the female relations of the ‘obstructive’ cases, fully 10 out of 31 showed these conditions; while in the other three groups the female relations, 16 in number, had only one with an obstructive lesion. The ‘atrophic’ cases, as far as they go, show the like similarity, and also bear out the

previously remarked female incidence of ozæna and of simple atrophic rhinitis.*

Thus the observations of Chapman Jarvis, who described septal deviation as often hereditary, and performed rhinological operations on the relatives of consumptives, are justified and confirmed; while also we are enabled to combine and understand those glimpses of ozænatous-consumptive families afforded us by laryngologists (Cholewa and Cordes, Noebel and Lohnberg, etc.) already mentioned. The tuberculosis physician must, then, when examining the 'contacts' of his phthisical patients, pay heed to their nasal condition.

Lastly, we cannot fail to mention that the common occurrence of the nasal defects characteristic of consumption in the clinically non-tuberculous relatives of consumptives, is some additional argument against tuberculosis being the cause of the nasal abnormalities in question.

ETIOLOGY.

Useful as may be the foregoing immediately available applications † of our piece or two of knowledge of phthisical predisposition, it is the knowledge itself, the addition to the etiology of tuberculosis, the definiteness accruing to the old idea of consumptive diathesis, that are most important and significant. These vulnerable persons and their general attributes form a subject worthy of much study. Hard upon this reflection there follows another, namely as to limitations of ability and opportunity; so that an indication, already noticed, as to a practicable line of inquiry becomes very valuable. That indication, that foothold, is the similarity of consumptives and the insane. We saw how the liability to squint forms a feature common to both

* Compare Rosenfeld's observation quoted in Part III, Chapter V, of a pedigree showing among the descendants of an ozænatous person those with atrophic nasal catarrh as well as those with true ozæna.

† There is yet another which follows upon the establishment of recognizable and demonstrable phthisical diathesis, namely the medico-legal aspect, especially in what are known as "compensation" questions, affecting the working classes.

classes, and how idiots are very prone to nasal insufficiency. We may suspect a like kinship in respect of our third anomaly, ichthyosis, for text-books mention that harshness of the skin is frequent in the insane. As general support for the idea we remember the known great liability of those of unsound mind to consumption. Lunatics and idiots become phthisical much more often than sane people do, whilst some authors maintain that there is a special form of insanity affecting consumptives, the so-called "phthisical insanity" of Clouston. We recall further the statements made as to over-frequency of phthisical family history in the insane, and vice-versâ. In view of these things, then, the consumption-insanity co-relationship, and the findings that two, at any rate, out of the three anomalies here under notice were common property of the insane and of the phthisical, it seemed advisable to study these three, not only when occurring in the latter class, but in the former too.

Before passing to the subject of this concluding *enquête*, one might digress briefly to remark that it is strange that nothing as to the association with consumption of any of the three anomalies seems to have been published by medical men who had the opportunity of studying such combination in their own person. Certainly there must have been many such who suffered both with tubercle and with nasal defect. From early days, before the writer had formed any theories on the subject, or acquired special knowledge of phthisis or of rhinology, several instances can be recalled most clearly. Six fellow-students are remembered to have become tuberculous. Of these six, P. had nearly quiescent phthisis. His attainments were a good deal above the average, and a surgical tutor, discussing his case in conversation, said it was doubly unfortunate, because P. had ozæna too, "which makes his phthisis worse." B., likewise a prizeman, who although big and heavy showed the open mouth and retreating chin of the habitual mouth-breather, died some time after graduation of sacro-iliac tuberculosis. F., another chronic

consumptive, had obvious, long-standing nasal obstruction with very noticeably malformed thorax and upper jaw. During an impressive lecture on the later stages of consumption it was generally remarked that the subjective aspect forced itself upon his feelings so much that he had to leave the theatre. These reminiscences, with their actualizing details, recognizable only by those who were students of a certain London hospital in the sufficiently remote 'nineties, will be excused because of their value as evidence. At a later date, a sanatorium physician who makes no secret of his stay as a patient at Nordrach-im-Schwarzwald, told the writer that his habitual mouth-breathing was an inconvenience to him when playing cricket, drying his throat and making him cough. A young, tall, and delicate-looking medical man, who attended a throat hospital for a few weeks in summer before taking up an assistantship to a well-known sanatorium, said that the dust of the London streets aggravated the effects of his atrophic rhinitis.

These instances—instances occurring in ordinary society—from one experience. It is strange, one may repeat, seeing how Rousseau, Abernethy, Floyer, Bree, Hack, Thomsen, Almroth Wright and others contributed to medicine by self-study, and seeing how many medical men nowadays make a recovery from consumption, that none of all the number situated as my acquaintances above-mentioned were situated, should have coupled consumption with nasal defect.

We pass on to the *Examination of Lunatics* already alluded to.

Access to material was very kindly afforded me by Dr. Francis Dudley, Medical Superintendent to the Cornwall County Asylum, Bodmin, and by Dr. W. G. Rivers. It amounted to 460 lunatics and 27 idiots. Eight days were spent in examining these subjects for ichthyosis, squint, and nasal defect. The examination was of the nature already described, the only regular omission being the anamnesis, which would of course be valueless when coming from insane persons. In some instances the post-nasal space was left uninspected, owing to refractoriness;

but as the nasal defect of consumptive persons, the object of our comparison, is rarely exclusively manifested in the naso-pharynx, this occasional omission did not affect results.

The numbers of the examinees of course fell far short of the total of patients in the institution. However, I was informed that those investigated gave a fair sample of the different kinds of insanity under treatment, as is further probable from the following tables:—

Lunatics.

| | | | Male. | Female. |
|---------------------------------|----|----|-------|---------|
| Secondary dementia | .. | .. | .. | 186 66 |
| Insanity and epilepsy | .. | .. | .. | 42 13 |
| Chronic melancholia | .. | .. | .. | 26 4 |
| Delusional insanity | .. | .. | .. | 23 9 |
| Adolescent insanity | .. | .. | .. | 22 10 |
| Primary dementia | .. | .. | .. | 22 — |
| Chronic mania | .. | .. | .. | 13 5 |
| Acute melancholia | .. | .. | .. | 6 — |
| Senile dementia | .. | .. | .. | 5 — |
| Acute mania | .. | .. | .. | 3 — |
| Recurrent mania | .. | .. | .. | 1 — |
| Confusional insanity | .. | .. | .. | 1 — |
| General paralysis of the insane | .. | .. | .. | 1 — |
| Not stated | .. | .. | .. | 1 1 |
| <hr/> | | | | |
| Totals | .. | .. | 352 | 108 |
| | | | 460 | |

The *Idiots*, among whom were some imbeciles, were made up of 26 males and 1 female—total 27.

The above seems a very fair sample, with one exception, of the common insanities at present generally distinguished. Secondary dementia, "the bourne to which all chronic insanity tends," naturally preponderates. The infrequency of G.P.I., already alluded to, is explained by the absence of large centres of population in the district served by the institution in question.

* * * * *

Now, to take *ichthyosis* first, this skin affection was not found at all in the idiots.

Amongst the lunatics it was found 5 times, i.e. in rather

more than 1 per cent. of them. All the 5 cases were in male lunatics. But even if we adopt the percentage on the whole number, i.e. a little over 1 per cent., it is still much higher than that (1 in 500, or 0·2 per cent.) found in the control of normal males mentioned in Part I. It remains, however, less than that (23 in 1,600, or 1·4 per cent.) found in consumptives.

With *squint*, while the same main result came out, i.e. great excess incidence as compared with the general population, the details of distribution were reversed. Instead of being absent in the idiots, it occurred in them the oftenest; instead of being less common in the insane than in the phthisical, it was more common. The figures were:—

Idiots—

2 cases, both males, in 27 = 7 per cent.

Lunatics—

Male, 8 cases in 352 = 2 per cent.

Female, 2 cases in 108 = 1 , ,

Total, 12 cases in 487 = 2·4 , ,

As to the *kind* of squint, the 2 cases met with in the idiots were both divergent, one of the right, and one of the left eye.

The 8 in the male lunatics were half convergent (2 R, 2 L) and half divergent (2 R, 2 L).

The 2 in the female lunatics were 1 left convergent and 1 right divergent.

Contrary, then, to what the French authority aforementioned states, in these insane the divergent form of strabismus was found more frequently than the convergent. It will be recalled that in our consumptives it was divergent squint that seemed especially common when compared with the non-tuberculous.

The following gives the distribution of ichthyosis and squint amongst the different kinds of lunacy, taking both sexes together:—

Ichthyosis.

| | | | |
|--------------------|----|----|------------------------------|
| Primary dementia | .. | .. | 1 case in 22 = 4·5 per cent. |
| Epileptic insanity | .. | .. | 1 case in 55 = 2 , , |
| Secondary dementia | .. | .. | 3 cases in 252 = 1 , , |

Squint.

| | | | |
|---------------------|----|----|-----------------------------|
| Adolescent insanity | .. | .. | 2 cases in 32 = 6 per cent. |
| Primary dementia | .. | .. | 1 case in 22 = 4·5 ,, |
| Secondary dementia | .. | .. | 6 cases in 252 = 2 ,, |
| Epileptic insanity | .. | .. | 1 case in 55 = 1·8 ,, |

Lastly, it is to be noted that, as in the consumptives, squint and ichthyosis were never found coinciding in a patient.

Next, as to *nasal defect*. An abnormal nasal condition occurred in 14 out of the 27 idiots, i.e. in just over 50 per cent. This high proportion might have been expected, seeing the already mentioned agreement of authorities as to the frequency of nasal obstruction in these subjects. It will be remembered that in Part III we found the proportion of nasal defect found in the general population to be roughly one-third, and in consumptives to be about two-thirds. The kinds of nasal insufficiency present amongst the idiots were quite usual ones, and nearly all of the obstructive type :—

| | | | | |
|----------------------------------------|----|----|----|----------|
| Deviated septum .. | .. | .. | .. | 5 cases |
| The same, plus adenoids.. | .. | .. | .. | 1 case |
| Dislocated septal cartilage | .. | .. | .. | 4 cases |
| Adenoids, plus projecting incisors | .. | .. | .. | 1 case |
| Projecting incisors | .. | .. | .. | 1 ,, |
| Rhinitis sicca | .. | .. | .. | 1 ,, |
| Mouth-breathing from no apparent cause | .. | .. | .. | 1 ,, |
| Total | | | | 14 cases |

Nasal defect in lunatics generally was not so common as in idiots, not rising significantly above the proportion found already in the general population. In the 460 lunatics there were 164 with nasal defect : in the 452 'controls,' 166. In one direction a small exception must be recorded, however, viz. perforation of the nasal septum, a lesion we found in Part III to occur in 0·8 per cent. of consumptives and in 0·2 per cent. of 'controls.' Amongst the 487 insane patients examined were seen 4 septal perforations, a percentage of 0·8. But although this proportion is just the same as that found in consumptives, and although, as in the consumptives, the lesion affected males only, I do not consider it to have the same significance in the two classes. To begin with, it was never seen in the idiots,

who, as already noted, were most subject otherwise to nasal abnormality. Then only one perforation in the insane had the characters of the kind due to dry rhinitis. Another perforation (in a patient with secondary dementia) was very like a syphilitic lesion, and of course this disease suggests itself as a cause, because of the relative frequency of a specific taint in lunatics. However, I was informed that the proportion of patients giving positive Wassermann reaction was low (further likely, of course, from the already mentioned local rarity of general paralysis) and that in particular, during a period of three months, no female admission showed it. Still, none of the perforations was in females. As likely a cause as syphilis, perhaps, is the inveterate habit lunatics have of cramming small foreign bodies into natural apertures, like the mouth and nose. One patient, before coming into the examination-room, and while the attendant, who missed remarkably little of his charges' conduct, had his back turned for an instant, stuffed into the left nostril a pellet of bread. In another was seen a foreign body which had been in the right nasal fossa for some time, and in a third a rhinolith. Probably this habit conduces in some measure to the production of septal perforation.

Another slight abnormality, not deranging nasal respiration, was asymmetry of the nostrils. This had nothing to do with dislocation of the septal cartilage, and did not narrow the airway, being probably a part of that general facial asymmetry common in the insane.

The real nasal defects were of the usual kinds, and may be divided, as previously in Part III, into 'obstructive,' 'atrophic,' and 'various.' They came out thus :—

| | | Male Lunatics. | Female Lunatics. |
|------------------------------|-------------------|-------------------|------------------|
| Obstructive group | 78 (22 per cent.) | 16 (14 per cent.) | |
| Atrophic group | 9 (2 ,,) | 12 (11 ,,) | |
| 'Various' group | 30 (8 ,,) | 19 (17 ,,) | |
| | — | — | — |
| | 117 | 47 | |
| Add the nasally normal cases | 235 | 61 | |
| | — | — | — |
| Totals | 352 | 108 | |
| | | 460 | |

For comparison one might give again the same figures for our 452 non-tuberculous 'controls.'

| | | Male Controls. | Female Controls. |
|------------------------------|-----|-------------------|-------------------|
| Obstructive group .. | .. | 81 (25 per cent.) | 17 (12 per cent.) |
| Atrophic group .. | .. | 5 (1 , ,) | 17 (12 , ,) |
| 'Various' group .. | .. | 30 (9 , ,) | 16 (12 , ,) |
| | | <hr/> | <hr/> |
| | | 116 | 50 |
| Add the nasally normal cases | 205 | | 81 |
| | | <hr/> | <hr/> |
| Totals .. | .. | 321 | 131 |
| | | | 452 |

The agreement of the figures is close throughout. It does not seem likely, therefore, that the *general* phthisical predisposition of lunatics proper can be due to prevalence amongst them of nasal defect.

Next, in order to investigate as to any possible special incidence of nasal defect, one must compare in this respect the different kinds of lunacy; and as the numbers are small, the sexes will be taken together and only the more common kinds included.

| Variety of Lunacy. | | No. of Cases. | Nasally Abnormal. |
|------------------------|----|---------------|-------------------|
| Secondary dementia .. | .. | 252 | 88 (34 per cent.) |
| Epileptic insanity .. | .. | 55 | 18 (32 , ,) |
| Adolescent insanity .. | .. | 32 | 10 (31 , ,) |
| Delusional insanity .. | .. | 32 | 12 (37 , ,) |
| Chronic melancholia .. | .. | 30 | 11 (36 , ,) |
| Primary dementia .. | .. | 22 | 8 (36 , ,) |
| Chronic mania .. | .. | 18 | 8 (44 , ,) |

Seeing the scanty numbers of the last variety, the above proportions do not warrant the supposition of any particular variety of lunacy proper being distinguished by liability to nasal defect.

But, to recapitulate, idiocy was so distinguished. Idiocy was also distinguished by the high percentage of squint found therein, as compared with other forms of insanity; so, in a secondary degree to that of idiocy, was adolescent insanity.

As regards ichthyosis, primary dementia perhaps showed a high liability. Summing up, then (of course with an admission that these detail figures are small ones), it is found that the forms of mental unsoundness amongst which our three stigmata of phthisical predisposition, ichthyosis, squint, and nasal defect, are especially rife, are:—

Idiocy (including imbecility), adolescent insanity, primary dementia.

This branding of idiocy, dementia *præcox*, and primary dementia (first ascertained some weeks after the data were collected) is of interest because it affords opportunity for comparison with the forms of insanity that alienists describe as those upon which pulmonary tuberculosis supervenes most often.

The comparison in question is, however, not a very handy one to make, for there are many classifications of insanity, and those in use formerly seem very different from present-day ones, although it is only in modern times that the kinship between consumption and insanity has been recognized. Clouston believes that every variety of lunacy contributes to the insane phthisical contingent, the members of which are specially characterized in various stated ways, the most definite of which seems to be a monomania of suspicion. This is not very helpful, nor does this view seem to be widely held.

At an asylum at Auxerre (French Retrospect in *Journal of Mental Science*, April 1878) the patients most liable to chronic pulmonary tuberculosis and to entero-mesenteric disease were first, demented, and melancholics with stupor, then idiots, and lastly the maniacal.

The committee appointed in 1901 by the Medico-Psychological Association to investigate the occurrence of tuberculosis in institutions for the insane reported that the demented, congenital imbecile, and idiot were subject to the disease at least four times as often as other mental patients.

Professor Mott (*The Lancet*, November 21, 1908, p. 1546) has said that he "believed tuberculosis was not acquired in asylums. Patients in those institutions were of low

vitality and they developed tuberculosis because of that. The disease got rid of many of the unfit, especially amongst cases of insanity. For the first three or four decades there were records of more than 2,000 necropsies, and there were certain types of insanity the subjects of which were especially liable to tuberculosis: especially adolescent insanity, melancholia, and the hereditary forms of mental disturbance. He believed that in those people there was a favourable soil which led to the easy development of the tuberculosis organism."

In Stoddart's *Mind and its Disorders*, p. 421, it is stated that Dr. Shaw found the tuberculo-opsonic index low in the insane generally, and especially deficient during the acute stages of mental disorder and in cases of dementia præcox and of general paralysis.

From these four sources we find, then, that the following forms of insanity are mentioned as being specially vulnerable to tubercle:—

Dements, stuporous melancholics, idiots, imbeciles, the subjects of dementia præcox, melancholics, general paralytics; while of these again the following are mentioned by more than one author:—

Dements, idiots, the subjects of dementia præcox.

So that it may fairly be said that in all probability dementia generally, idiocy, and dementia præcox are the forms of insanity most prone to develop tuberculosis.

Now, since we have found that the forms of insanity together most prone to our three anomalies of squint, ichthyosis, and nasal defect are idiocy, dementia præcox, and primary dementia, it will be allowed that there is an appearance here of somewhat close parallelism of the incidence in the insane of tuberculosis and of our three marks of phthisical predisposition. Without insisting to the foot of the letter upon this parallelism, it is urged that these anomalies constitute stigmata of phthisical predisposition in both sane and insane subjects.

But to what other pathological classes does this tendency to bodily anomaly and malformation relate the consumptive,

and to what new conception of the consumptive does it point? We have seen *ichthyosis* common not only in phthisis and in insanity, but also mention of its frequency in the weak-minded, in the subjects of developmental defect, in prematurely born children; squint common, too, in the deaf and dumb, in albinos, in the members of neurotic families, in the offspring of consanguineous unions, so it is said. These classes stated to be similarly distinguished may nearly all of them be designated physically degenerate, or more correctly, physically aberrant. And we suspect that physical aberrancies are often a mark of mental aberrancy, whether 'favourable' or unfavourable in its reactions. Speaking broadly, in both men of genius and in lunatics, those allied classes, physical stigmata are found, although not perhaps the same ones. Certain physical stigmata of consumptives can be accounted for, even in the present state of our knowledge, as active factors in their predisposition to that disease. Such are nasal defect, which deranges an important section of the respiratory apparatus, harmlessly, *quâ* clinical tubercle, in certain individuals with whom counteracting constitutional or environmental influences come into play, but on the whole with distinct phthisical predisposing effect; ichthyosis, which may heighten skin permeability; poverty of physique, which may entail physiological leucopenia, and depression of the general health in the struggle for life; congenital cardiac malformation, and so on. But other of their peculiarities, like squint, like polymastia, like aural malformation, like (I believe) bifid uvula, cannot be so accounted for. What then distinguishes the original constitution of phthisical individuals, what it is that constitutes the peculiarity found in them more often than in members of the general community, is a certain innate tendency to physical degeneracy, or again, more exactly, to physical aberrancy. Again there comes in a related mental aberrancy, and perhaps a very multiform one, immoral as well as intellectual. To begin with the latter, we may repeat that consumption is known to be rife amongst the insane. But amongst

consumptives there is also often noticeable a certain brilliancy of intellectual equipment. This has often been remarked upon. The monotonous advocates of tuberculo-toxæmia as the cause of the characteristics of the consumptive have supposed tuberculous toxins to be a cerebral stimulant, even trying, for instance, to distinguish favourably those parts of R. L. Stevenson's work which were written when his lung disease was active. Here again tuberculo-toxæmia will not account for all the facts. The idea of cerebral stimulation may sound plausible in presence of erethistic intellectual brilliance, but it will hardly explain the great number of consumptive idiots. A more philosophical conception of this question, perhaps, is that now outlined. As regards native intellectual endowment, the consumptive, compared with the general average of the community, is less often 'in the mean,' more often in the extreme. He is more likely to approach, on the one hand, the man of genius or talent, the 'remarkable man,' and on the other hand the insane person. Appeal may be made to experience for illustrations of both these tendencies.

First let there be taken an experience which may be easily checked. In the case of most children attending a tuberculosis dispensary, one of the first therapeutic measures is to relieve them from ordinary school attendance, which, however valuable for their minds, is depressing to the general health of their bodies. How frequent then are such parental remarks as these: "It's a pity, too, because he was always so forward with his lessons. The teacher will be disappointed"; or "Yes, she's had to stay away before, but she always catches up to the others again very quick"; or in the case of an older scholar: "The schoolmaster was wanting him to sit for a scholarship examination." Among adult patients, this comparative commonness of intellectual aptitude is not so noticeable, perhaps because of the dulling effect of the mechanical occupations to which the working-class is heir—because of the 'world's slow stain' in short—but also maybe because their conditions

of life are hygienically adverse, so that after twenty years or so not only those vulnerable to phthisis fall victims, but fairly often those too with normal constitution.

And sharply offsetting this phenomenon is its opposite. Not only does one encounter clever, forward children with pulmonary tuberculosis, but also very backward ones, who are a 'standard' or two behind those of their age and who even may never succeed in learning to read; children with a degree of microcephaly, with unequally sized orbits, with wide, foolishly smiling mouths. If one bears in mind the frequency with which a correlation of phthisis with intellectuality has been mentioned, and also its known association with idiocy and lunacy, I do not think that the contrast above stated has been fancied rather than impartially noted and described.

The second piece of experience is one involving opportunity of closer, more constant observation. For a reason above given, a private sanatorium is for this purpose much preferable to a public one. Nearly every sanatorium the inmates of which come from the middle and upper social classes will have its patient or two who, if not exactly feeble-minded, is certainly noticeably a little 'wanting,' or a little crazed in some direction. The regularity with which this occurs in different institutions, and with which the supply is maintained in each one, is rather striking. Such a patient usually becomes, not at all uncomfortably, the butt of the others. In accounts of these institutions by those who have stayed at them the same feature can be traced. Thus it was told that at one private sanatorium some years ago a celebrated professional golfer was being treated. His fellow-patients easily incited one of their number to challenge him to a match, and as the professional reproduced exactly each of the amateur's many mistakes, the latter won. He was then further elated by the receipt of a bogus letter from a golfing journal requesting his photograph, which was taken publicly in extravagantly athletic costume. From another assembly, of but 14 or 15 in number, and during a period of only a few months, the writer can recall the

following personalities: There were two young women of the type just described, hardly definitely weak-minded, but recognized by all as being very simple. There were three individuals who without university education had earned money at journalism of some little standing; one of them made his living thus. There was another girl, a doctor's daughter and well brought up, whose parents had had trouble with her on account of her running after working-men; this taste necessitated special supervision* at the sanatorium. There was what is known as a 'racing man,' of the second class: he boasted of acquaintance with a pugilist who at the time was in prison for fraud. There was a young black-and-white artist. And there was an amateur county cricketer. So that although the varying mental aberrancy of these people was in no one case highly remarkable—there was no actual man of genius, no actual lunatic, no actual criminal amongst them—yet it can be seen that broadly, as a class, they tended in all three directions. An assembly of equal numbers not pathologically selected, say at a boarding-house, could never, I think, have shown so many slightly out of the ordinary in different mental respects; while these mental aberrancies, like, as we have seen, the physical ones, are all too diversely numerous to have the common cause of tuberculo-toxæmia. The above is an extreme example; even private sanatoriums are not as a rule so rich in exceptional people; but in that household was shown, if over-distinctly, what the writer believes to be a fact, namely, that among consumptives not only bodily anomaly, but also mental and moral eccentricity, is commoner than among the general population.

Now, of classes thus characterized one has already heard. The most comprehensive term for their characteristic members is the bad one of 'degenerate,' a word popularized by Lombroso's writings. The period of reaction against the vital part of that work is already passing away; and to the present writer consumptives seem, like lunatics

* It is well known how quickly scandals occur at a slackly supervised sanatorium.

or men of genius, to have among them many innate 'degenerates,' *sensu Lombroso*.

* * * * *

But, to step back to surer ground, the trend of the evidence presented in this book is to establish an endogenous factor in the disease due to pulmonary tuberculosis; to bear out the ancient theory of phthisiogeny expressed in the familiar image of the soil and the seed; and to impute unsuspected importance to the *terrain*. Were a townsman set the task of bringing clover into a pasture, he would probably begin by sowing its seed, and get small result. The practical agriculturist would do nothing at all but scatter basic slag, and the next spring clover would come in profusion. May the reverse of this success attend new, additional prophylactic measures against consumption! With the susceptible soil safeguarded from access of seed, may a diminution in the crop of the phthisical ensue! And may the crude natural eugenic activity that cannot be denied the bacillus of Koch be better, and humanely, replaced by science!

If this one malady be selective, so can others. The dichotomy into selective and indifferent is a needed medical cross-classification.

PROTOCOL

Appended are particulars of the chief points of interest as to the nose and throat condition of the 500 sputum-positive consumptives who form the chief clinical material studied.

| NO. | OCCUPATION AND AGE. | TURBAN STAGE. | LARYNX. | | NOSE. | POST-NASAL SPACES. | NASAL ANAMNESIS. |
|-----------------------------|---------------------|---------------|------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------|
| | | | — | — | | | |
| A. OBSTRUCTIVE CASES | | | | | | | |
| 1 | Collier | 19 III | — | Polypi left | — | — | Obstruction as long as he can remember |
| 2 | Labourer | 22 I | — | Dislocated septal cartilage to right | — | — | — |
| 3 | Brickmaker | 51 I | — | Deviated septum to left; chronic rhinitis | — | — | A mouth-breather all his life |
| 4 | Sea cook | 47 II | — | S-shaped deviation of septum; anterior end right inferior turbinate enlarged | Posterior edge of septum thickened; posterior ends of inferior turbinates enlarged, especially the left | — | — |
| 5 | Warehouseman | III 27 | Both cords rounded at edges; the right one red posteriorly | S-shaped deviation of septum; a dry spot at entrance of right nostril | Thickening of posterior edge of septum; remains of adenoids | — | Crust from the right nostril for the last nine months |
| 6 | Soldier | 29 III | — | Chronic rhinitis | — | — | Nocturnal obstruction before chest symptoms |
| 7 | Warehouseman | II 36 | — | Septum to right, touching the inferior turbinate | — | — | — |
| 8 | Pastrycook | II 28 | — | Septum to right | — | — | Nose stuffy for an uncertain time |

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| 9 | Post Office clerk 21 | I | — | Projection of superior incisors | — | — |
| 10 | Clerk | 26 | II | Infiltration and reddening of both cords | Dislocated septal cartilage to left | 'Nasal catarrh' for years past |
| 11 | Tram conductor 34 | II | — | — | Enlarged posterior ends of inferior turbinates | — |
| 12 | Clerk | 43 | I | — | Septum to left touching inferior turbinate | — |
| 13 | Quarryman | 60 | II | — | (Not seen) | — |
| 14 | Factory hand | 29 | II | — | Septum to left | — |
| 15 | Telegraphist | 24 | II | Cords red | Septum to right | — |
| 16 | Compositor | 31 | III | Slight thickening of posterior wall | Septum to left; anterior end right inferior turbinate much enlarged | Remains of adenoids |
| 17 | Clerk | 19 | I | Infiltration of both cords, especially the left | Septum to right; external deviation to left | Obstruction and mouth-breathing since being kicked on the nose at football fifteen years ago |
| 18 | Electrician | 34 | II | Ventricular bands enlarged; cords injected in region of vocal processes | Dislocated septal cartilage to left | Tonsils removed formerly |
| | | | | | Remains of adenoids, enlarged posterior end left inferior turbinate | All his life very subject to colds in the head |

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ▲NAMNESS. |
|-----|---------------------------|---------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| | STAGE. TUBER. | | | | |
| 19 | Waste-paper sorter 29 | I | — | Dislocated septal cartilage to left. Upper part left side of septum dry; bleeding point, left middle turbinate | Small pad of adenoids A mouth-breather since trauma to nose ten years ago, for which he had a nasal operation |
| 20 | Pattern-maker 32 | II | — | Septum to right | Stuffiness of right side of nose noticed for a year or two |
| 21 | Engineering apprentice 16 | II | Cords red, and paresis of internal tensors | Narrow nose; slight dislocation of septal cartilage to left | Nose stuffy as long as he can remember. Adenoids removed formerly |
| 22 | Brass-turner 32 | II | — | Septum to left | Left side always stuffy |
| 23 | Chauffeur 28 | III | — | Septum to right | One or other side obstructed |
| 24 | Plater's helper 34 | III | — | Loss of substance of right ala nasi; dislocated septal cartilage to right; right middle turbinate boggy and enlarged | Injury to nose at football fourteen years ago |
| 25 | Draughtsman 27 | III | — | Septum to right anteriorly | Used to be a mouth-breather, and about a year ago was troubled with periodical crust-ing in the right nostril |

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| 26 | Slinger (ex-soldier) | III | — | Septum rather to left | — | — |
| 27 | Clerk | 24 | II | Narrow nose; thick septum. Slight protrusion of superior incisors | — | — |
| 28 | Builder's overseer | 42 | II | Slight thickening of posterior wall | A mouth-breather as long as he can remember | — |
| 29 | Pupil teacher | 18 | III | — | Breathes mostly through the mouth; subject to hay fever and frequent coryza | — |
| 30 | Fitter | 39 | II | Paresis internal tensors | A mouth-breather; injury to nose by fall some years ago | — |
| 31 | Fitter | 29 | II | — | — | Five years ago operated on for deviated septum. |
| 32 | Quarryman | 38 | III | — | At present crusts from the nose occasionally | — |
| 33 | Theological student | 24 | III | Red cords with rounded edges | Six years ago had a nasal operation | — |
| 34 | Joiner | 25 | II | — | Epistaxis, nasal obstruction, and discharge from back of nose for the last five years | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|-----------------------|---------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------|
| | | STAGE. | TYPE. | | | |
| 35 | Carter | 20 | II | — | — | A mouth-breather, very subject to coryza |
| 36 | Apprentice blacksmith | 17 | Left ventricular band slightly enlarged | Projection of superior incisors with obvious dental irregularities | — | Mouth-breathing, nasal obstruction and hypersecretion for the last three months |
| 37 | Fitter | 36 | II | External deformity, S-shaped septal deviation; slight dislocation of septal cartilage to right; hypertrophy anterior end right inferior turbinate | — | A mouth-breather, especially at night |
| 38 | Insurance agent | 22 | III | Basal spur right; left inferior turbinate enlarged | — | Nose stuffy in cold weather |
| 39 | Iron-turner | 35 | II | — | — | For last four years epistaxis on washing face in the morning |
| 40 | Dental mechanic | 33 | II | — | — | Right side sometimes stuffy |

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| 41 | Joiner | 40 | II | Superficial ulceration posterior part of left, and, to a less extent, of right cord | S shaped deviation of septum, with basal spur | Mouth-breather at night | — |
| 42 | Drailler | 19 | II | — | Narrowish nose; septum to right; spur left. Slight protrusion of superior incisors | Small adenoids | — |
| 43 | Clerk | 21 | III | — | Projection of superior incisors; obvious dental irregularity; septum to left and dislocated septal cartilage to right | Small adenoids | Nose stuffy at night all his life |
| 44 | Gardener | 23 | III | — | Dislocated septal cartilage to right; septum to left | — | Right side almost always blocked |
| 45 | Cloth-miller | 27 | I | — | Septum to right | Remains of adenoids | (Mentally rather deficient) |
| 46 | Labourer | 34 | II | — | External nasal deformity; septum to right | — | External deformity ever since he can remember |
| 47 | Apprentice hatter | 20 | III | — | Projection superior incisors; slight dislocation of septal cartilage to left | — | — |
| 48 | Steel-worker | 40 | I | — | Septum to left | — | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESES. | |
|-----|------------------------|---------|--------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------|
| | | | | | STAGE. | TYPE. |
| 49 | Woolen-worker 23 | III | — | Spur left | Adenoids | Epistaxis and nocturnal obstruction for last five years |
| 50 | Farm labourer 35 | II | — | Dry with crusting in left side | Crusting | Soreness and obstruction for last few years |
| 51 | Clerk 23 | II | — | — | — | Consulted a doctor some seven years ago about obstruction of right side |
| 52 | Barber 30 | I | — | Septum to right; slight dislocation of septal cartilage to left | Remains of adenoids | — |
| 53 | Labourer 31 | II | Left cord rather redder than the right one | Septum to left | Right, choana more patent than left | Left side obstructed |
| 54 | Wholesale draper 26 | II | — | Projection superior incisors; septum and dislocated septal cartilage to left | — | — |
| 55 | Labourer 20 | III | Left ventricular band enlarged | Spur left | Smallish adenoids | Left side stuffy for the last two or three weeks |
| 56 | ? | 29 | II | — | Dislocated septal cartilage to right; crusting in front | Obstruction right side |

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| 57 | Plumber | 28 | I | Paresis internal tensors | Septum to right; dislocated septal cartilage to left | — | — |
| 58 | Chamfeur (ex-soldier) | 34 | I | — | Syphilitic perforation of septum, and crusting | — | Mouth-breathing |
| 59 | Cobbler | 22 | III | — | Septum to right; slight crusting left side | Right side often obstructed | — |
| 60 | Gardener | 21 | II | — | Dislocated septal cartilage to right | — | — |
| 61 | Apprentice caulkier | 16 | II | — | Vertically placed nostrils | Adenoids | — |
| 62 | Clerk | 36 | I | Inter-arytenoid tumour; cords red and fleshy, especially the right | Septum to left; right side dry in front | — | Mouth dry on waking in morning |
| 63 | Minister of Religion | 42 | I | — | Hypertrophy anterior end right, inferior turbinate; left one slightly enlarged | — | Trauma to nose at football when about sixteen |
| 64 | Canvasser | 46 | II | — | External deformity; septum to right; on left side of septum an erosion | — | Always stuffy on right side; had used Ferrier's snuff for frequent colds, and noticed he could not draw it up the right nostril |
| 65 | Timekeeper | 28 | II | — | Spur left; septum slightly to right | — | Right side stopped since blow on nose eight or nine years ago |
| | | | | | | Left side easily gets blocked | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. STAGE. TUBERC. | NOSE. | POST-NASAL SPACE. | | NASAL ANAMNESIS. |
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| | | | | — | — | |
| 66 | Street-sweeper 34 | II | Septum to right; right side dry | Posterior end right turbinate enlarged | — | — |
| 67 | Labourer 24 | II | Septum to right; left middle turbinate enlarged | Posterior inferior turbinate enlarged | — | — |
| 68 | Collier 19 | II | Septum to left; left inferior turbinate enlarged | Luschka's tonsil slightly enlarged | — | Sometimes obstruction |
| 69 | Chemists' assistant 25 | II | Narrowish nose and hyper-secretion | — | — | — |
| 70 | Surveyor 27 | II | Posterior wall thickened; both cords, especially the left, superficially ulcerated | Septum to right | — | — |
| 71 | Labourer (ex-soldier) 45 | II | Septum to left | Septum to left | — | Left ala nasi cut in an accident, set. 35 |
| 72 | Shop-assistant 34 | III | Basal spur left; both sides dry in front | — | — | Right side not so clear as left |
| 73 | Labourer 39 | II | Septum to right | (Not seen) | — | — |
| 74 | Apprentice fitter 19 | II | Vertically placed nostrils; septum to left | Very small pad of adenoids | — | — |

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| 75 | Commercial traveller | 44 | II | Cords red posteriorly and edges thickened | Septum and dislocated septal cartilage to left | Left side sometimes obstructed | — |
| 76 | Clerk | 29 | III | — | Septum to right; left inferior turbinate enlarged | Right side not free | — |
| 77 | Clerk | 37 | II | — | External deformity; dislocated septal cartilage to right. Pallor of whole mucosa | Right side always blocked when he has a cold | — |
| 78 | Weaver | 33 | II | — | Left inferior turbinate enlarged | Mouth-breathing mostly by day and always at night | — |
| 79 | Tailor | 34 | II | — | Dislocated septal cartilage to left | — | — |
| 80 | Labourer (ex-soldier) | 42 | I | — | Septum to left; right nasal fossa dry | — | — |
| 81 | Striker | 20 | II | — | Projection of superior incisors; double spur; septum slightly to left | For the last two or three years epistaxis on washing the face | — |
| 82 | Boiler-maker | 27 | II | — | Septum slightly S-shaped | Mouth-breathing at night as long as he can remember | — |
| 83 | Engineer | 25 | III | Swelling of left arytenoid and left ary-epiglottic fold | Septum to left; dislocated septal cartilage to right | Mouth-breathing and alternate nasal obstruction | Luschka's tonsil a little enlarged |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. STAGE. TUDMAN | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | | | | GENERAL BREATHING. |
| 84 | Gardener | 35 II | — | S-shaped deviation of septum | Generally breathes through the mouth; injury to nose by fall twenty years ago |
| 85 | Machinist | 27 II | — | Projection of superior incisors; septum rather to right, and grooved by right inferior turbinate | Nose obstructed before chest symptoms |
| 86 | Clerk | 25 II | Paresis internal tensors | Deviated septum and dislocated cartilage to right; left middle turbinate enlarged | Nose gets stuffy in close atmospheres; used to breathe through the mouth, especially at night |
| 87 | Cabinet-maker | 39 II | Posterior wall a little thickened | Septum to right; polypi right side | — |
| 88 | Turner | 38 III | — | Dislocated septal cartilage to right | — |
| 89 | Clerk | 29 II | — | Irregular deviation of septum; slight dislocation of septal cartilage | A mouth-breather |
| 90 | Labourer | 21 II | — | Slight S-shaped septal deviation (front teeth and posterior pharyngeal wall dry) | — |

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| 91 | Brass-moulder 43 | II | — | Septum to right, basal spur to left | — | Frequent coryza for last twenty years |
| 92 | Apprentice fitter 20 | II | — | Dislocated septal cartilage to right | A mouth-breather | — |
| 93 | Schoolmaster 28 | II | — | Dislocated septal cartilage to right | Kick on nose seven or eight years ago | Nose stuffy for at any rate two years; shortly before going to sanatorium had uvula amputated |
| 94 | Woolcomber 24 | I | — | Left inferior turbinate enlarged | — | — |
| 95 | Engineer 38 | I | — | Septum to right | — | Frequent mouth-breathing; right side of nose especially liable to be obstructed |
| 96 | Fitter 32 | III | — | Hyperplasia left inferior turbinate; slight external nasal deformity | Posterior ends of inferior turbinates rather enlarged | Nose hard to breathe through for the last eight years |
| 97 | Wood machinist 20 | II | — | Chronic rhinitis | — | — |
| 98 | Plater 39 | II | — | Septum rather to right, anteriorly | Can only breathe for a very short time through nose | — |
| 99 | Labourer (ex-soldier) 29 | II | — | Dislocated septal cartilage to right | Injury to nose once or twice | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | STAGE. TUBERC. | STAGE. TUBERC. | | | |
| 100 | Clerk | 19 | II | — | Septum to left | — |
| 101 | Collier | 24 | II | — | Basal ridge right side of septum ; right middle turbinate enlarged | — |
| 102 | Joiner | 22 | III | — | Septum to left | (Not seen) |
| 103 | Clerk | 18 | I | — | Basal spur, under which a small area of the posterior naso-pharyngeal wall is visible | Adenoids |
| 104 | Labourer | 30 | III | — | Dislocated septal cartilage to right | — |
| 105 | Paperhanger | 33 | III | Small inter-arytenoid projection; vascular patch on right cord | A peg of adenoids | Collapsed nostrils; slight dislocated septal cartilage to right |
| 106 | Certman | 33 | III | — | Narrow nose; septum to right; dried secretion right | Nose sometimes stuffy at night; the left side generally the one obstructed |

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| 107 | Brass-moulder 30 | II | — | Large sharp-edged perforation anterior part of septum; dislocated septal cartilage to right; right middle turbinate shows polyoid degeneration; on the left side mucopus about the middle meatus and ethmoidal cleft | Slight epistaxis when at his trade, as a prophylactic (!) to the dust of which he has taken snuff: states that snuff-taking is a common habit of brass-moulders |
| 108 | Stoker | 19 | II | — | A mouth-breather |
| 109 | Clerk | 18 | II | Pallor of mucosa | — |
| 110 | Labourer | 21 | II | Ulceration of both cords; ventricular bands enlarged | Æt. 9 treated at hospital for injury to nose against a wall; since this has always had bilateral nasal discharge. Is a mouth-breather. |
| 111 | Druggist's packer (ex- soldier) | II | — | Vertically placed nostrils; septum rather to right; muco-purulent secretion on left middle turbinate; pharynx seen left | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|------------------------|---------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------|
| | | TUBERC. | STAGE. | | | |
| 112 | Plater's helper 32 | III | Fleshy patch on right cord | Septum rather to left; pharynx seen right | — | Crusts from the nose in the mornings sometimes, especially the right side |
| 113 | Labourer 22 | III | Left cord redder than the right | Septum and dislocated septal cartilage to right; pharynx seen left | — | — |
| 114 | Collier 23 | II | — | Basal spur right; pharynx seen left | Moderate sized adenoids | Nose rather stuffy |
| 115 | Collier 16 | III | — | Septum rather to right; pharynx seen left | — | — |
| 116 | Collier 40 | II | — | Septum to right; pharynx seen left | — | — |
| 117 | Draughtsman 19 | II | Pyriform swelling left ary-epiglottic fold; ventricular bands slightly enlarged | Dislocated septal carti- lage to left; pharynx seen right | — | — |
| 118 | Wire-worker 31 | II | — | Dislocated septal carti- lage to left; pharynx seen right | — | External deformity; sep- tum to right; left side dry and pharynx seen; protrusion of superior incisors |
| 119 | Sawyer 32 | II | — | — | Remains of adenoids | Right side of nose stuffy since the occurrence of chest symptoms |

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| 120 | Labourer | 25 | II | Poresis of internal tem- sors | Large basal ridge left; pharynx seen right | — | — |
| 121 | Stonemason | 44 | III | — | Septum to right | — | — |
| 122 | Labourer | 29 | III | Vocal processes of cords red; slight inter-ary- tenoid projection | Septum to left; spur left, under which the pharynx is seen | A mouth-breather; nose generally obstructed | |
| 123 | Insurance agent | 40 | II | — | Septum to left; basal ridge left; pharynx seen right | Sometimes dried crusts from nose in the morning | |
| 124 | Clerk | 37 | II | Left cord rather red and thickened | Small basal spur left; pharynx seen right | Some obstruction on the left side as long as he can remember; for the last three weeks blood- stained crusts from the right side | |
| 125 | Clerk | 92 | I | — | Pharynx seen right | Alternate obstruction; sometimes bi-lateral obstruction | |
| 126 | Joiner | 19 | I | — | Posterior end of right inferior turbinate en- larged; chronic rhinitis | Nose stuffy for the last two or three years | |
| 127 | Police constable | 22 | I | — | Pharynx seen left | For the last two or three months one side or other of the nose nearly always stopped up | |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|---------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 128 | Bank clerk 25 | II Ulceration left cord and left ventricular band; right ventricular band swollen, and the arytenoids slightly so | Spur right side | — | Hay-fever every year |
| 129 | Compositor 30 | III Paresis of internal tensors; on right cord fleshy patch anteriorly | Septum to left; right side dry | — | For the last few years has had crusts from the right side every day, and also noticed right side freer than left |
| 130 | Farm labourer 34 | III — | Septum rather to left; pharynx seen right | — | A mouth-breather |
| 131 | Engineer 25 | II — | Protrusion superior incisors; spur left, under which pharynx seen | Posterior end right inferior turbinate enlarged | — |
| 132 | Clerk 21 | II — | Dislocated septal cartilage to left, and left inferior turbinate enlarged; pharynx seen right | Posterior end left inferior turbinate enlarged | — |
| 133 | Tram driver 29 | II — | Septum to left; pharynx seen right | — | — |

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| 134 | Machinist | 38 | II | Paresis of internal tensors; left vocal process enlarged | Basal spur left; pharynx seen right | — | — |
| 135 | Tram conductor | 34 | III | — | Both middle turbinates enlarged and covered with muco-pus | — | For over a twelvemonth discharge and crusts from the nose, especially the right side |
| 136 | Engineer | 32 | II | — | Septum to right | — | Crusts from left side of nose for the last five weeks |
| 137 | Police constable | 25 | I | — | Septum rather to left; right side dryish | — | Ever since he can remember has epistaxis if he blows his nose hard |
| 138 | Brickworks labourer | 26 | II | Cords rounded and injected, with superficial ulceration on the free border of the left one | Septum to left; pharynx seen right | — | Small pad of adenoids; left choana not so patent as right |
| 139 | Cartman | 44 | II | (Not seen) | Septum to left | — | For a few years past occasionally crusts from the nose in the morning, generally from the right side |
| 140 | Clerk | 29 | I | Cords red | Thick septum, with a bleeding point on its right side | — | Occasional epistaxis and crusts in the right nostril ever since he can remember |

THREE CLINICAL STUDIES

| No. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|-----------------------------|---------|----------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| | | | | | STAGE. |
| 141 | Publican 57 | II | Septum to right; left side dry | — | — |
| 142 | Bottle-blower 40 | I | Septum to left; pharynx seen right | — | — |
| 143 | Labourer 53 | I | Septum to left; pharynx seen right | — | — |
| 144 | Plate-layer (ex-soldier) 54 | II | Septum to left; green crusting in right side | Right choanae capacious, with the turbinates hardly visible | For the last three months the left side blocked, and crusts from the nose |
| 145 | Collier 49 | II | Septum to left and pharynx seen left; dry nose | — | Left side obstructed |
| 146 | Clerk 25 | I | Projection of superior incisors; pharynx seen right | (Not seen) | Occasional epistaxis from an early age |
| 147 | Collier 23 | III | External deformity; dislocated septal cartilage to left; blood crusts right side | — | Epistaxis from right side, and that side stuffy—this since the appearance of chest symptoms |
| 148 | Pattern-maker 28 | I | Left side narrow; right side dry, and pharynx seen | — | For the last six months occasional epistaxis on blowing nose |

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| 149 | Collier | 39 | I | — | Basal spur right; pharynx slightly seen left | — | Occasional epistaxis (noticed before chest symptoms) |
| 150 | Warehouseman | 40 | I | — | Pharynx seen left | — | Nocturnal obstruction; as a young man much epistaxis |
| 151 | Clerk | 43 | I | — | Right side narrow; spur left side, under which pharynx is seen | — | — |
| 152 | Clerk | 29 | II | — | Right inferior turbinate enlarged; pharynx seen left | — | Alternate obstruction; adenoids removed when a child |
| 153 | Warehouseman | 52 | III | — | Small polypus right; pharynx seen left | — | For at least four years has had 'catarrh' at back of the nose, |
| 154* | ? | 31 | II | — | Hypertrophy of anterior end of right inferior turbinate | — | — |
| 155 | Carman | 21 | II | — | Basal spur left; pharynx seen right | (Not seen) | — |
| 156 | Butcher | 30 | II | Inter-arytenoid rather full | space | Slight dislocated septal cartilage to left and basal spur under which pharynx is seen; right middle turbinate shows 'cleav- age' and much muco- pus in inferior meatus | Very subject to coryza; for some years has lost the sense of smell |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. STURBAN | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|---------------------|--------------------|----------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 157 | Turner 28 | II | External deformity; septum to left; chronic rhinitis | Posterior end of right inferior turbinate enlarged; much mucopus | For a little time nasal obstruction and scraping of secretion from back of nose |
| 158 | Grocer 29 | I | Left middle turbinate enlarged; muco-pus in middle meatus both sides | — | Nocturnal obstruction; for about two years nasal discharge, mostly left-sided |
| 159 | Farmer 27 | II | Septum and dislocated cartilage to right; left side a little dry | — | Left side freer than right; for the last two years an occasional bad-smelling nasal discharge from left nostril |
| 160 | Holder-up 29 | II | Left arytenoid overlaps the right one in phonation | Dislocated septal cartilage to left | Three years ago had epistaxis for three days —nose plugged |
| 161 | Book sewer 31 | III | Posterior wall slightly thickened | Septum to left | Right side clearer than left; for the last four or five years symptoms of post-nasal catarrh |
| 162 | Housewife 32 | III | Posterior wall slightly thickened | Moderate-sized adenoids | Occasional dysphagia for some years past |

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| 163 | Home | 27 | II | Ventricular bands a little enlarged | Septum to left; pharynx seen below the deviation | — |
| 164 | Home | 26 | II | — | Basal septal ridge right; pharynx seen left | — |
| 165 | Home | 35 | II | — | Protrusion of superior incisors; septum slightly to right; pharynx seen left | — |
| 166 | Librarian | 29 | III | — | Left side narrow; pharynx seen right | — |
| 167 | Domestic servant | III | — | Left inferior turbinate enlarged; pharynx seen right | — | Ever since she can remember has had occasional epistaxis and very occasional discharge of crusts |
| 168 | Home | 20 | II | Very slight thickening of posterior wall | Protrusion of superior incisors | — |
| 169 | Home | 18 | II | — | Septum to left | Sometimes epistaxis; always from the right nostril |
| 170 | Housewife | 23 | II | — | Slight projection of superior incisors; collapsed nostrils; basal spurs, under the right one of which the pharynx is seen | A mouth-breather |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|---------------------|---------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 171 | Home 33 | II | — | — | During the preceding summer epistaxis about once a week, on blowing the nose hard |
| 172 | Housewife 30 | II | Basal spur left, and middle turbinate enlarged; dry right side; bleeding point on each side of septum | — | A mouth-breather in foggy weather |
| 173 | Clerk 23 | II | — | — | A mouth-breather |
| 174 | Shopwoman 25 | II | — | — | — |
| 175 | Typist 32 | II | Both ventricular bands enlarged, especially the right; small interarytenoid projection | External deformity; septum and large basal spur right; left middle turbinate enlarged; pharynx seen left | — |
| 176 | Domestic servant 26 | III | — | Projection of superior incisors; slight dislocation of sepal cartilage to left; pharynx seen right | Remains of adenoids A mouth-breather |

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| 177 | School-teacher 29 | II | -- | Septum and dislocated septal cartilage to left; pharynx seen right | -- | -- | A rather frequent mouth- breather |
| 178 | Shopwoman 25 | III | Small inter-arytenoid papilliform projection | Projection of superior incisors; spur right and pharynx seen right | -- | -- | A mouth-breather |
| 179 | Home | 18 | III | -- | Dislocation of septal cartilage to right; pharynx seen left | -- | Epistaxis since childhood; a year ago went to a doctor for obstruction of the left side of the nose |
| 180 | Housewife | 31 | I | -- | Left inferior turbinate enlarged | -- | Nose always stuffy |
| 181 | Health visitor 23 | III | -- | Chronic rhinitis; bleed- ing point on right side of septum | -- | -- | Nose stuffy in damp weather |
| 182 | Convent servant 20 | II | -- | Sputum slightly to left; on right side adenoids seen from the front | Adenoids | -- | Right side of nose always harder to breathe through than the left one |
| 183 | School-teacher 24 | III | -- | Sepum to left; right middle and right inferior turbinate en- larged | -- | -- | Right (!) side more likely to be blocked than left |
| 184 | Home | 34 | II | -- | Septum to left | Slight adenoids | -- |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESES. |
|-----|------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 185 | Housewife 34 | II Papilliform projection and swelling of right side of inter-arytenoid space | Both inferior turbinates enlarged | — | Mouth - breathing rather frequent |
| 186 | School-teacher 27 | I — | Septum to right | (Not seen) | Right side not so free as the left one |
| 187 | Packer 21 | II — | Chronic rhinitis | — | Has always been a mouth-breather |
| 188 | Home 24 | II — | Septum to right; chronic rhinitis | — | Has always had obstruction on the right side; generally breathes through the mouth; subject to hay-fever |
| 189 | Home 32 | II — | External deformity; dislocation of septal cartilage to right; deviated septum to left | — | Ten years ago consulted a doctor for epistaxis from left side of nose |
| 190 | Lead factory worker 29 | III — | Right inferior turbinate enlarged | Posterior end right inferior turbinate enlarged | — |
| 191 | Schoolgirl 16 | II — | Adenoids seen from front | — | Sometimes nocturnal obstruction |

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|-----|------------------|----|-----|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 192 | Housewife | 25 | II | — | Luschka's tonsil somewhat enlarged | Nose hard to breathe through since suffering a blow on it at the age of five |
| 193 | Hospital nurse | 34 | II | — | Septum to left; slight projection of superior incisors | — |
| 194 | Domestic servant | 22 | II | — | Projection of superior incisors; narrow nose; slight dislocation of septal cartilage to right | (Not seen) |
| 195 | Housewife | 44 | II | Paresis of internal tensor; slight thickening of posterior wall | Narrow nose and thick septum | — |
| 196 | Domestic servant | 23 | III | — | Septum to right | — |
| 197 | Bookkeeper | 21 | II | — | Septum to left; dry right side | Small peg of adenoids |
| 198 | Housewife | 34 | III | — | Septum to right | — |
| 199 | Home | 17 | II | — | Inferior turbinates enlarged | Posterior ends of inferior turbinates enlarged |
| 200 | Housewife | 39 | II | — | Projection of superior incisors; narrow nose | Nocturnal mouth-breath-ing all her life |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|--------------------------------------|---------|----------------------------------------------------|-----------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------|
| | | STAGE. | STAGE. | | | |
| 201 | Shopwoman 19 | I | — | Chronic rhinitis | Adenoids | Cannot keep the mouth closed for long |
| 202 | Sugar-boiler 20 | II | — | — | Adenoids | Breathes through the mouth a good deal |
| 203 | School-teacher 27 | II | Paresis of internal tensors | Projection of superior incisors; curly septum | — | Frequent mouth-breather |
| 204 | Feather-worker 19 | I | Paresis of internal tensors | Septum to left | Adenoids | Obstruction left side; yellow discharge from both sides, but more so on the left |
| 205 | Matron 36 | II | — | Slight projection of superior incisors | Right choana not so patent as the left one | Nose always rather stuffy |
| 206 | Employee in electric lamp factory 18 | II | Small conical projections in inter-arytenoid space | External deformity; septum to right | Small adenoids | For the last few months "greenish phlegm dropping from the nose on both sides" |
| 207 | Labourer 27 | II | — | — | — | For last four or five months accumulation of phlegm at back of nose |

B. ATROPHIC CASES

Pharynx seen both

PROTOCOL

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| 208 | Collier | 45 | III | Both arytenoids enlarged; right cord in cadaveric position and nearly fixed, left one slightly ulcerated posteriorly; both ventricular bands enlarged; later, epiglottis infiltrated | Pharynx seen both | Both middle turbinates in contact with septum | For last eight or nine years periodical cold in head and orbital pain relieved by discharge of bad-smelling pus from right nostril |
| 209 | Labourer | 33 | III | — | Dislocated septal cartilage to right; pharynx seen both; left side dryish | Remains of adenoids | A mouth-breather |
| 210 | Printer's helper | 23 | I | Cords red and fleshy; right arytenoid enlarged | Dry nose; manifest atrophy of both inferior turbinates | Remains of adenoids | — |
| 211 | Turner | 35 | II | — | Septum to right; pharynx seen both | — | — |
| 212 | Waiter | 32 | III | — | Dislocated septal cartilage to right; pharynx seen both; bleeding points both sides of septum | Epistaxis and right-sided obstruction ever since he can remember | — |
| 213 | Bricklayer | 23 | II | — | Dislocated septal cartilage to left; right side dryish; pharynx seen both | Very slight adenoids | Generally obstructed one or other side |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESES. | |
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| | | | | | STAGE TUBERC. | STAGE TUBERC. |
| 214 | Collier | 38 II | — | — | External deformity; crooked septum but no obstruction; pharynx seen both | — |
| 215 | Publican | 35 III | — | — | Septum to left; right side dry; pharynx seen both | — |
| 216 | Warehouseman | III 21 | — | Right middle enlarged | Pharynx seen both | — |
| 217 | Collier | 37 II | — | Right middle enlarged | Pharynx seen both | Has always been subject to epistaxis |
| 218 | Fitter | 33 III | — | Right middle enlarged | Pharynx seen both | Alternate obstruction |
| 219 | Clerk | 23 II | — | Right middle enlarged | Pharynx slightly seen both | — |
| 220 | Labourer | 45 II | — | Right middle enlarged | Pharynx seen both | — |
| 221 | Labourer | 29 II | Slight thickening of epithelium in inter- arytenoid space | Right middle enlarged | Pharynx seen both; bleeding point right side of septum | — |
| 222 | Stonemason | 29 III | — | — | Pharynx seen both; vertical nostrils; foetid green crusts all over both nasal fossae | For last five years epis- taxis on blowing nose, and crusts from nose sometimes producing obstruction |

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|-----|------------------------|-----------|-----|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 223 | Gardener | 19 | II | — | Pharynx seen both | — | — |
| 224 | Ex-quarryman | III 21 | III | — | Pharynx seen both | — | — |
| 225 | Stonemason | 35 | II | — | Pharynx seen both | (Not seen) | Epistaxis when younger |
| 226 | Sand-moulder | II 23 | II | — | Pharynx seen both; muco-pns on right middle turbinate | Unduly patent choanae | Two or three years ago began to notice bad smell in the nose when- ever he had a cold; was out-patient at an infirmary for this; crusts from the nose sometimes, especially the right side |
| 227 | Chemist's assistant | 18 | III | Anterior part of inferior turbinate manifestly shrunken | Posterior end of right inferior turbinate en- larged | Phlegm dropping from back of nose into throat | Phlegm dropping from back of nose into throat |
| 228 | Cotton-worker | 34 | I | Arytenoids enlarged; cords fleshy anteriorly; posterior wall thickened and inter- arytenoid projection | Pharynx seen both | — | Some discharge of crusts from nose |
| 229 | Farmer | 36 | II | — | Pharynx seen both | — | Occasionally crusts, some- times blood-stained, from both sides of the nose |
| 230 | Pattern-maker | III 29 | III | — | Pharynx seen both | — | — |

THREE CLINICAL STUDIES

| No. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | EDGERS | EDGERS | | | |
| 231 | Collier | 25 | III | — | Pharynx seen both | — |
| 232 | Goldminer | 41 | III | Ulceration of both cords, especially the left; ventricular bands both enlarged | Pharynx seen both; right middle turbinate enlarged | Sometimes epistaxis from left side of nose |
| 233 | Collier | 24 | II | — | Pharynx seen both; blood-stained crust on left middle turbinate | Blood on his handkerchief for the last three or four months |
| 234 | Collier | 24 | III | — | Pharynx seen both | For last three or four years epistaxis on blow- ing the nose |
| 235 | Labourer | 63 | II | — | Spur right; pharynx seen both | — |
| 236 | Collier | 45 | II | — | Pharynx seen both; left middle turbinate en- larged and 'cloven' | For years past has had discharge of crusts from the nose |
| 237 | Collier | 41 | II | — | Pharynx seen both | — |
| 238 | Labourer | 47 | II | — | Pharynx seen both | — |
| 239 | Housewife | 24 | II | — | Pharynx seen both; pus in left sphenoidal cleft | For the last eight years has suffered from nasal discharge and festor; has been to various institutions for this |

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| 240 | Housewife | 38 | III | — | Dislocated septal cartilage to right; pharynx seen both | — | — |
| 241 | Schoolgirl | 17 | II | — | Projection of superior incisors; septum slightly to left; pharynx slightly seen both | — | — |
| 242 | Telegraphist | 32 | III | — | Pharynx seen both | — | — |
| 243 | Housewife | 19 | I | — | Pharynx seen both, although the anterior end of the left inferior turbinate is enlarged | Luschka's tonsil slightly enlarged | — |
| 244 | Home | 25 | II | — | Septum to right; dislocated septal cartilage to left; left middle turbinate enlarged; pharynx well seen both | A mouth-breather | — |
| 245 | Housewife | 36 | III | — | Some projection of superior incisors; pharynx seen both | — | Operation for adenoids three years ago |
| 246 | Home | 20 | I | — | Septum rather to left; pharynx seen both | — | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|---------------------|---------|----------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 247 | Nurse 30 | II | — | Pharynx seen both | Epistaxis from childhood onwards; 'nasal catarrh' ten years ago |
| 248 | Cashier 30 | II | — | Pharynx seen both | — |
| 249 | Home 15 | III | — | Pharynx seen both | — |
| 250 | Schoolgirl 10 | II | — | Pharynx seen both | (Not seen) |
| 251 | Home (?) | II | Right cord slightly injected | Pharynx seen both | Slight adenoids |
| 252 | Housewife 33 | II | — | Pharynx seen both | — |
| 253 | Charwoman 40 | II | Slight papilliform interarytenoid projection | Pharynx seen both | — |
| 254 | Housewife 31 | I | Posterior wall slightly thickened | Pharynx seen both | For the last six months has noticed blood on the handkerchief sometimes |
| 255 | Housewife 39 | III | — | Pharynx seen both; slightly fetid crusts | Epistaxis from childhood; lately crusting |
| 256 | Domestic servant 33 | III | — | Pharynx seen both; blackish-green crusts, especially on right side | Five or six years ago commenced going to the doctor on account of crusts coming from the nose |

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| 257 | Home | 29 | II | — | Pharynx seen both | — | — |
| 258 | Home | 14 | III | — | Pharynx seen both | — | — |
| 259 | Milliner | 31 | III | — | Pharynx seen both | — | — |
| 260 | Housewife | 28 | III | Left cord ulcerated posteriorly; both ventricular bands enlarged, the right having a tuberculum on it, and the left being ulcerated | Pharynx seen both | (Not seen) | Epistaxis for the last year |
| 261 | Nurse | 28 | III | Slight heaping up of epithelium in interarytenoid space | Pharynx seen both | — | Five years ago much epistaxis; crusts and discharge from the nose for the last six months |
| 262 | Housewife | 41 | III | — | Pharynx seen both; many crusts | — | Crusts from the nose ever since she can remember |
| 263 | Landlady maid | 24 | II | — | Vertical nostrils; pharynx seen both | — | Lately the nose sometimes stuffy |
| 264 | Cook | 27 | II | — | Vertical nostrils; septum slightly to right; muco-pus in left olfactory cleft; pharynx seen both | — | For last two months nasal discharge and crusting |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | STAGE. | SYMPTOMS. | | | |
| 265 | Home 19 | II | — | Vertical nostrils; pharynx seen both | Small adenoids | — |
| 266 | Home 33 | II | — | Pharynx seen both | — | — |
| 267 | Housewife 38 | I | Small inter-arytenoid elevation | Pharynx seen both | — | — |
| 268 | Housewife 39 | II | — | Pharynx seen both; slight dislocation of septal cartilage to left | — | Crusts from both sides of the nose sometimes |
| 269 | Home 25 | III | — | Slight projection of superior incisors; pharynx seen both | — | For the last few months crusts and epistaxis occasionally |
| 270 | Home 26 | II | — | Pharynx seen both | — | Crusts from the nose sometimes |
| 271 | Housewife 24 | II | — | Pharynx seen both | — | — |
| 272 | Shopwoman 23 | III | — | Pharynx seen both | — | — |
| 273 | Laundrymaid 30 | II | — | Vertical nostrils; pharynx seen both | — | — |
| 274 | Shopwoman 26 | II | — | Projection superior incisors; pharynx seen both | — | Sometimes crusts from the nose |

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| | | | | Frequent coryza |
| 275 | Field-worker 18 | II | — | — |
| 276 | Home | 32 | II | — |
| 277 | Housewife | 36 | III | Since occurrence of chest symptoms has noticed epistaxis, 'catarrh of nose,' and sometimes crusts |
| 278 | Cookery-teacher | I | — | — |
| 279 | Housewife | 29 | I | Epistaxis |
| 280 | Housewife | 30 | I | For last four years symptoms of post-nasal catarrh |
| 281 | Domestic servant | III | (?) | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SP. NO. | NASAL ANAMNESES. |
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| C. OTHER RHINO-PATHOLOGICAL CASES | | | | | |
| 282 | Grocer 31 | II | Pharynx seen right | — | — |
| 283 | Canvasser 21 | III | Vertical nostrils; pus in left olfactory cleft and on floor of right nasal fossa; left middle turbinate enlarged | A streak of pus in front of left Eustachian orifice | For last two years greenish nasal discharge; subjective fetor |
| 284 | Metal-grinder 31 | I | Pharynx seen left; offensive muco-pus left side | — | Left side blocked and occasional epistaxis from that side for five or six years; fetor |
| 285 | Rivetter 34 | II | Pharynx seen left under a basal spur | — | Symptoms of post-nasal catarrh |
| 286 | Driller 24 | I | Pharynx seen right | — | — |
| 287 | Tramwayman 30 | II | Pharynx seen left | — | For at any rate two years past has had epistaxis in summer |
| 288 | Police constable 36 | III | Pharynx seen left | — | Crusts from the back of the nose for years past |
| 289 | Plumber 22 | II | Septum slightly to right, behind; pharynx seen left | — | — |

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| 290 | Boiler-maker | 24 | II | Posterior wall slightly thickened | Pharynx seen left; bleeding point on anterior end of right inferior turbinate and on right side of septum | — | Epistaxis occasionally since becoming adult |
| 291 | Clerk | 32 | I | — | Pharynx seen right; dry left side | — | — |
| 292 | Sailor | 27 | III | — | Pharynx seen left | — | Occasional epistaxis lately |
| 293 | Cabinet-maker | 24 | I | Right cord injected | Basal spur left; Pharynx seen right; roomy nose | — | Nasal crusting before occurrence of chest symptoms; epistaxis added since |
| 294 | Drayman | 22 | II | Left arytenoid epiglottis, and left ary-epiglottic fold enlarged; inter-arytenoid projection | Pharynx seen right | — | Always subject to epistaxis |
| 295 | Chauffeur | 24 | II | — | Pharynx seen left; dry right side, and enlarged vessels on right side of septum | — | For a few years past occasional epistaxis, often from the right side |
| 296 | Insurance agent | 51 | II | — | Pharynx seen left; dry nose | — | — |
| 297 | Signalman | 22 | III | — | Pharynx seen right; rhinitis sicca | — | A mouth-breather; used to get yellowish crusts from back of nose |
| 298 | Collier | 34 | III | — | Pharynx seen left | — | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | STAGE. TUBERCLE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | | PHARYNX. | NOSE. | | | |
| 299 | Shipwright | 22 | I | — | Pharynx seen right | — | — |
| 300 | Grocer | 24 | II | — | Pharynx seen left | Small central pad of adenoids | — |
| 301 | Railway porter | 39 | II | — | Lupus lesion on left side of bridge externally; pharynx seen right | — | For the last twenty years crusts from nose, especially the right side |
| 302 | Machinist | 40 | II | — | Pharynx seen right | — | — |
| 303 | Draughtsman | 27 | III | — | Vertical nostrils; pharynx seen left | (Not seen) | — |
| 304 | Collier | 27 | II | — | Pharynx seen right | — | — |
| 305 | Collier | 40 | II | — | Polybi on both middle turbinates | — | — |
| 306 | Collier | 18 | I | — | Pharynx seen right | — | — |
| 307 | Collier | 28 | II | — | Nasal tuberculosis; ulcer on left side of septum; granulations on anterior end of left inferior turbinate | — | For last three months crusts left side of nose, and epistaxis on using handkerchief; nose sore to touch |
| 308 | Labourer | 39 | III | — | Pharynx seen right | — | — |
| 309 | Collier | 47 | II | Pallor of mucosa | Pharynx seen right | — | — |

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| 310 | Collier | 36 | III | Slight pachydermia | Pharynx seen right | — | — |
| 311 | Labourer | 46 | III | — | Septum to right | — | — |
| 312 | Clerk | 19 | III | — | Pharynx seen left; dry nose; bleeding point left side of septum | — | — |
| 313 | Boilermaker | 45 | II | — | Right inferior and middle turbinates enlarged; crusting left side and narrow | — | — |
| 314 | Gardener | 17 | II | — | Chronic rhinitis | — | — |
| 315 | Police constable | III | — | Slight crusting left side | — | — | — |
| 316 | Labourer | 24 | II | Singer's node on left cord | Dryish nose | — | — |
| 317 | Wood-cutting machinist | 37 | III | — | Septum to right; slight dislocation of septal cartilage to left; left middle turbinate enlarged | — | — |
| 318 | Chauffeur | 26 | III | Narrow nose | Small central peg of adenoids | of | For eight months past symptoms of post-nasal catarrh |
| 319 | Labourer | 24 | II | — | — | — | From childhood epistaxis on washing face in the morning |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESES. |
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| | TRADE AND STAGE. | | | | |
| 320 | Police constable 27 | II Paresis of internal tensors | Hyper-secretion | — | For last five or six years "catarrh" and running from the front of nose |
| 321 | Chemist's assistant 21 | I — | Pharynx seen right | — | For the last three weeks alternate obstruction of one or other side |
| 322 | Paper-ruler 37 | III — | Muco-pus in inferior meatus both sides | — | For the last two years running from the back and front of the nose, for which he went to a throat hospital |
| 323 | Cashier 44 | II Cords injected, especially posteriorly; projection on right cord and corresponding hollow on left one | Dryish nose; small bleeding point on right side of septum | — | Subject to epistaxis before, and since, occurrence of chest symptoms |
| 324 | Labourer 43 | II — | Dry nose; thin-edged perforation anterior part of septum; dislocated septal cartilage to left | — | Seventeen years ago blow on nose at football; for last sixteen years occasional epistaxis; for last four or five years symptoms of post-nasal catarrh |
| 325 | Caulker 47 | I Singer's node on left cord | Dryish nose; bleeding spot left side of septum | — | Occasional epistaxis from left side; tonsils removed twelve years ago |

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| 326 | Iron-moulder | II | — | — | Pharynx seen left |
| 327 | Farmer | 27 | III | — | Enlarged vessels front of septum right side |
| 328 | Weaver | 46 | III | — | Basal spur left, under which pharynx is seen |
| 329 | Collier | 25 | III | — | Pharynx seen right |
| 330 | Printer | 30 | III | — | Pharynx seen right |
| 331 | Draper | 44 | II | — | Pharynx seen right |
| 332 | Mantle hand | 26 | I | — | Recent bleeding spots on right side of septum |
| 333 | Dressmaker | 21 | II | — | Pale mucosa; dilated vessels both sides of septum, especially the right |
| 334 | Home | 28 | III | — | Narrow nose; slight dislocation of septal cartilage to left |
| 335 | Mill hand | 14 | III | — | Vertical nostrils; pharynx seen right; nose dry |
| 336 | Home | (?) | III | — | Pharynx seen left |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | STAGE. | TYPE. | | | |
| 337 | Housewife 32 | II | — | Pharynx seen left | — | — |
| 338 | Shopwoman 26 | III | Posterior wall thickened; inter-arytenoid projection | Pharynx seen left | — | — |
| 339 | Housewife 36 | III | — | Pharynx seen left | — | — |
| 340 | Mill hand 20 | III | — | Pharynx seen left | — | — |
| 341 | Housewife 37 | II | Posterior wall and arytenoids slightly enlarged | Pharynx seen left | — | Crusts from both sides of nose |
| 342 | Home 45 | III | — | Remains of adenoids | — | — |
| 343 | Teacher 24 | II | Slight paresis internal tensors | Pharynx seen right | — | Epistaxis; symptoms of post-nasal catarrh |
| 344 | Clerk 20 | II | — | Nose dry | — | Crusts sometimes; much epistaxis as a child |
| D. NORMAL CASES | | | | | | |
| 345 Collier | 37 I | — | — | — | — | — |

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THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | | | | STAGE. |
| | | | | | TUBERAN |
| 359 | Clerk 25 | II | Right side a trifle narrow | — | — |
| 360 | Clerk 26 | II | Nose a little dry; bleeding point on right side of septum | — | For the last two months a little epistaxis from the right side |
| 361 | Steel-worker 39 | I | Middle turbinate a little enlarged | — | — |
| 362 | Stone-picker 15 | III | Septum a little irregular | — | Rather frequent coryza |
| 363 | Publican 35 | III | Septum a trifle to left | — | — |
| 364 | Storekeeper 32 | III | — | — | Epistaxis for the last year |
| 365 | Clerk 17 | I | Nose a little narrow | — | Occasional epistaxis for the last six months |
| 366 | Cartman 18 | III | Singer's node on left cord | — | — |
| 367 | Labourer 34 | II | Right ventricular band enlarged | — | — |
| 368 | Journalist 55 | II | — | — | — |
| 369 | Tobacconist 44 | I | — | — | — |

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|-----|-------------------------|----|----------------------------------------|------------------------------------------------------------------------|------------------------------------------------|---|---------------------------------|
| 370 | Blind-maker 18 | II | | | | | |
| 371 | Moulder | 39 | II | — | — | — | — |
| 372 | Engineer | 42 | II | — | Septum rather thick | — | — |
| 373 | Cellarman | 33 | II | — | — | — | A little mouth-breathing lately |
| 374 | Weaver | 17 | III | — | — | — | Epistaxis as a schoolboy |
| 375 | Labourer | 48 | II | — | — | — | — |
| 376 | Tramwayman | II | Slight paresis of the internal tensors | — | Slight dislocation of septal cartilage to left | — | — |
| 377 | Signalman | 38 | III | — | Slight deviation of septum to right | — | — |
| 378 | Pavior | 45 | I | — | Localized deviation of septum to right | — | — |
| 379 | Blacksmith's apprentice | 19 | II | — | — | — | — |
| 380 | Leather-cutter | II | — | — | Slight protrusion of superior incisors | — | — |
| 381 | Waiter | 20 | III | Posterior wall and both arytenoids swollen; granulations on right cord | Septum a little to left (Not seen) | — | — |
| 382 | Turner | 31 | II | — | Septum slightly to right | — | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
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| | | SEX. | AGE. | | | |
| 383 | Brass-moulder 21 | I | — | Basal spur right | — | Breathes through the mouth somewhat |
| 384 | Engineer 34 | II | Flat inter-arytenoid tumour; right cord moves better than left one, and on phonation the right arytenoid overlaps the left | Right middle turbinate a little enlarged | — | Rather frequent coryza |
| 385 | Blacksmith's apprentice 18 | I | Arytenoids somewhat enlarged; cords injected | — | Remains of adenoids | — |
| 386 | Collier 39 | II | — | — | — | — |
| 387 | Ragman 54 | II | — | Right side a trifle narrow and right middle turbinate a little enlarged | — | — |
| 388 | Fireman 32 | I | — | — | — | — |
| 389 | Insurance collector 46 | II | — | — | — | — |
| 390 | Collier 21 | III | — | Septum a little to left | — | — |
| 391 | Collier 58 | II | — | Right side a little narrow; left inferior turbinate a little enlarged | — | — |

| | | | | | | | |
|-----|-----------------------|----|-----|---|---------------------------------|---|--------------------------------------------------------------------|
| 392 | Railwayman | 36 | III | — | Irregularly shaped septum | — | — |
| 393 | Factory hand | 25 | II | — | — | — | Nose occasionally stuffy lately |
| 394 | Packer | 18 | III | — | (Not seen) | — | — |
| 395 | Ship's steward | 40 | II | — | — | — | Occasional epistaxis for some years; occasional obstruction lately |
| 396 | Asylum attendant | 29 | I | — | — | — | — |
| 397 | Collier | 18 | I | — | — | — | — |
| 398 | Watchmaker | 38 | II | — | — | — | — |
| 399 | Tailor's apprentice | 16 | III | — | — | — | — |
| 400 | Naval petty officer | 34 | I | — | — | — | — |
| 401 | Labourer (ex-soldier) | 27 | II | — | Narrowish nose, turbinals small | — | Epistaxis occasionally |
| 402 | Clerk | 29 | I | — | Septum irregularly shaped | — | Left side more likely to be obstructed than right |
| 403 | Blacksmith | 35 | I | — | Septum a little to left | — | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|-------------------------|---------|----------------------------------------------------|---------------------------------------------------------------|-------------------|------------------|
| | | STUDY | STAGE. | | | |
| 404 | Organ-builder 22 | II | — | Slightly dry | — | — |
| 405 | Cartman 39 | I | — | Small basal spur left | — | — |
| 406 | Tramwayman 29 | III | — | Slight dislocation of septal cartilage right | — | — |
| 407 | Commercial traveller 34 | II | — | Localized deviation of septum to left | — | — |
| 408 | Cartman (ex-soldier) 40 | II | — | — | — | — |
| 409 | Ex-soldier 34 | III | — | — | — | — |
| 410 | Tramwayman 24 | I | — | Septum rather irregularly shaped | — | — |
| 411 | Collier 24 | II | — | — | — | — |
| 412 | Brick-maker 30 | III | Anatomical abnormality in shape of right arytenoid | Small spur left | — | — |
| 413 | Fitter 23 | I | — | — | — | — |
| 414 | Commercial traveller 26 | II | — | Septum a little to right; bleeding point right side of septum | — | — |

PROTOCOL

265

| | | | | | | |
|-----|--------------|----|-----|---------------------------------------|----------------------------------------------------------------------------|---|
| 415 | Labourer | 28 | II | — | Vertically placed nostrils | — |
| 416 | Clerk | 46 | II | — | Pharynx just seen right; left middle turbinate enlarged | — |
| 417 | Schoolmaster | 42 | I | — | Septum a trifle to left | — |
| 418 | Labourer | 37 | III | Slight paresis of internal tensor | Septum slightly to left | — |
| 419 | Clerk | 20 | II | — | Basal spur right; turbi- nates a little enlarged; but no obstruction | — |
| 420 | Clerk | 21 | II | — | Basal spur right; middle turbinate a little en- larged | — |
| 421 | Shopman | 17 | II | — | Left middle turbinate rather enlarged | — |
| 422 | Shopman | 25 | II | — | Luschka's tonsil enlarged | — |
| 423 | Clerk | 28 | III | Superficial right vocal process | Spur right | — |
| 424 | Labourer | 40 | II | — | — | — |
| 425 | Bartman | 24 | III | — | Slight dryness | — |
| 426 | Labourer | 47 | II | — | A little muco-pus in the left inferior meatus | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESES. |
|-----|---------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------|
| | STAGE. | TRIBUNA | | | |
| 427 | Insurance agent 31 | II Paresis of internal tensors; slight, interarytenoid projection | Septum to left below; small bleeding points both sides of septum | — | — |
| 428 | Collier 28 | II — | Dislocated septal cartilage to right | — | — |
| 429 | Night cab-driver 41 | II — | Slight projection of superior incisors; inferior turbinate a little enlarged | Right posterior end of inferior turbinate a little enlarged | Rather subject to coryza |
| 430 | Collier 32 | III Right cord moves not so freely as the left | Bleeding points on septum | For the last three months a little crusting in the right nostril | — |
| 431 | Potter 33 | II — | Septum to left below; right side a trifle dry | — | — |
| 432 | Machinist 33 | II — | Septum slightly to right | — | — |
| 433 | Engineer 28 | III — | Nose rather dry | — | — |
| 434 | Painter 36 | I — | — | — | Left side sometimes a little clogged |
| 435 | Riveter 38 | II — | Septum to left | — | — |

PROTOCOL

267

| | | | | | | | |
|-----|-------------------|----|-----|------------------------------------------------------------|---------------------------------------------------------------------------------|---|----------------------------------------|
| 436 | Oil refiner | 33 | III | — | Bright side a little narrower; trifling dislocation of septal cartilage to left | — | — |
| 437 | Fitter | 31 | II | — | — | — | — |
| 438 | Fitter | 36 | II | — | — | — | — |
| 439 | Tailor | 38 | II | Right cord redder than the left one | — | — | — |
| 440 | Collier | 24 | II | — | — | — | — |
| 441 | Clerk | 24 | II | — | — | — | — |
| 442 | Schoolmaster | 42 | II | Singer's nodes on cords; posterior wall slightly thickened | — | — | — |
| 443 | Milkman | 21 | II | — | Septum slightly to left; vertical nostrils | — | — |
| 444 | Shopman | 29 | III | — | — | — | For the last year occasional epistaxis |
| 445 | Labourer | 33 | II | — | — | — | — |
| 446 | Clerk | 27 | II | — | Dislocated septal cartilage to left | — | — |
| 447 | Apprentice plater | 22 | III | Small projections in inter-arytenoid space | Recent bleeding left side of septum; rather narrow nose | — | Epistaxis recently only |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|----------------------|------------------|-----------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 448 | Farmer 34 | II | — | Basal spur left in a rather wide nose; right side a little dry | — |
| 449 | Porter 41 | III | — | — | — |
| 450 | Apprentice fitter 16 | II (Not seen) | Basal spur right | — | — |
| 451 | Plater 44 | I | — | Posterior end of right inferior turbinate enlarged | — |
| 452 | Shopman 34 | II | Posterior wall a little thickened | At upper angle of junction of inner and outer walls of right nostril is a wart growing from the skin | The wart noticed for the last two months. (Removed without recurrence by caustic) |
| 453 | Collier 28 | II | — | — | — |
| 454 | Joiner 26 | I | — | — | — |
| 455 | Farm labourer 24 | III | — | — | — |
| 456 | Cabinet-maker I | — | — | — | — |
| 457 | Bookbinder 20 | III | — | — | — |

| | | | | | | | |
|-----|------------------|----------|-----|-----------------------------------------------------------------------------------------|------------------------------------------|---|------------------------|
| 458 | Machinist | 48 | II | — | Basal spur left | — | — |
| 459 | Police constable | II 24 | — | — | Septum rather to left | — | Epistaxis occasionally |
| 460 | Labourer | 33 | II | — | Dislocated septal cartilage to left | — | — |
| 461 | Fitter | 22 | II | — | — | — | — |
| 462 | Domestic servant | I 20 | — | — | Inferior turbinate a little enlarged | — | — |
| 463 | Housewife | 26 | III | — | — | — | — |
| 464 | Nurse | 25 | II | Posterior wall thickened; inter - arytenoid projection; left cord in cadaveric position | — | — | — |
| 465 | Shopwoman | 23 | II | Paresis of internal tensors | — | — | — |
| 466 | Housewife | 35 | I | — | — | — | — |
| 467 | Housewife | 21 | III | Flat wide inter - arytenoid tumour | Slight protrusion of superior incisors | — | — |
| 468 | Nurse | 30 | III | Arytenoids enlarged and ventricular bands slightly so; interarytenoid projections | Right middle turbinate a little enlarged | — | — |

THREE CLINICAL STUDIES

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESES. |
|----------------|---------------------|------------------|-----------------------------------------------------------------|------------------------------------------|--------------------------------------------------------|
| TUDBRAN STAGE. | | | | | |
| 469 | Housewife 34 | II (Not seen) | Septum very slightly to right | — | As a child habitual epistaxis; had nose plugged for it |
| 470 | Waitress 21 | III | Slight grooved interarytenoid tumour | Right inferior turbinate rather enlarged | — |
| 471 | Housewife 32 | II | — | — | — |
| 472 | Shopwoman 28 | II | Right cord moves better than left | Projection of superior incisors | Luschka's tonsil a little enlarged |
| 473 | Housewife 29 | II | — | — | Occasional mouth-breathing |
| 474 | Music-teacher 24 | II | — | Projection of superior incisors | — |
| 475 | Milliner 21 | II | — | — | — |
| 476 | Student 20 | I | — | — | — |
| 477 | Housewife 27 | II | Left ventricular band slightly enlarged | — | — |
| 478 | Home 27 | III | Slight inter-arytenoid projection; arytenoids slightly enlarged | — | — |
| 479 | Housewife 27 | II | — | — | — |

| | | | | | | | |
|-----|------------------|----|-----|-----------------------------------------------------------|------------------------------------------------|---------------------------------|----------------------------------|
| 480 | Milliner | 36 | II | | Dislocated septal cartilage to left | | Mouth occasionally dry on waking |
| 481 | Domestic servant | 18 | III | — | — | — | — |
| 482 | Nurse | 26 | I | — | — | — | — |
| 483 | Domestic servant | 28 | II | — | — | — | — |
| 484 | Manageress | 43 | III | — | Slight polypus right | — | — |
| 485 | Shopwoman | 21 | II | — | Vertical nostrils; septum a little to right | — | — |
| 486 | Charwoman | 18 | III | — | — | Tonsils removed three years ago | — |
| 487 | Housewife | 52 | III | — | Middle turbinates rather enlarged | — | — |
| 488 | Housewife | 45 | II | — | Slight dislocation of septal cartilage to left | — | — |
| 489 | Home | 22 | II | Right arytenoid swollen; small inter-arytenoid projection | — | — | — |
| 490 | Home | 24 | II | — | — | — | — |
| 491 | Domestic servant | 21 | II | — | — | — | — |

| NO. | OCCUPATION AND AGE. | LARYNX. | NOSE. | POST-NASAL SPACE. | NASAL ANAMNESIS. |
|-----|---------------------|--------------------------------------------------|-------------------------------------------|-----------------------------------------------|------------------|
| 492 | Home 17 | II (Later developed tuber. culous disease) | — | Remains of adenoids | — |
| 493 | Housewife 48 | II — | — | — | — |
| 494 | Teacher 21 | III — | — | — | — |
| 495 | Housewife 39 | II — | — | — | — |
| 496 | Housewife 28 | II — | Pharynx just seen right | — | — |
| 497 | Telegraphist 17 | II — | Left inferior turbinate enlarged | (Not seen) | — |
| 498 | Cook (?) | II — | — | — | — |
| 499 | Schoolgirl 12 | III — | — | — | — |
| 500 | Typist 25 | II — | Left inferior turbinate slightly enlarged | Posterior ends of turbinates a little swollen | — |

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